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APRIL 1939

UNITED STATES
DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, SECRETARY

BUREAU OF MINES
JOHN W. FINCH, DIRECTOR

INFORMATION CIRCULAR

MARKETING OF SALT

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INFORMATION CIRCULAR

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

MARKETING OF SALT[1]

By F. E. Harris[2]

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FOREWORD

The United States produces about 30 percent of the world output of salt. Numerous deposits occur in widely separated areas, but the leading producing States are California, Kansas, Louisiana, Michigan, New York, Ohio, Texas, Utah, and West Virginia. Although no great amount of salt is produced at present in Pennsylvania, the potential sources in that State recently aroused a good deal of interest.

The United States salt industry is highly organized; it comprises fewer companies than when small crude works with primitive methods and equipment eked out salt for local needs, but concentration of output brought about by modern inventions and methods of production has improved the quality of the produce greatly and accelerated production.

Almost every industry depends upon salt in some form, so numerous and varied are its uses. Either directly or indirectly, it enters into every waking and sleeping moment of our lives. Supplies are plentiful, and modern inventions and transportation have made it basically cheap, its almost universal cheapness being, in fact, the industry's chief marketing problem.

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[1] The Bureau of Mines will welcome reprinting of this article, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7062."
[2] Nonmetal Economics Division, Bureau of Mines.

Salt deposits occur in many more localities in the United States than are now producing. Selection of the producing centers depends upon the location of the marketing centers quite as much as upon the occurrence of deposits. No new undertaking should be contemplated unless a nearby market is assured.

Cheap though it is, salt so enhances the things for which it is used that the ultimate value rises to many times its intrinsic cost. Few raw materials are used so extensively in making chemicals and none so diversely. New uses for salt are being found continually.

Besides the annual Minerals Yearbook chapters (chiefly statistical) and a few scattered items in Mineral Trade Notes, no report on salt has been issued by the Bureau of Mines since W. C. Phalen's Bulletin 146, Technology of Salt Making in the United States, published in 1917. No publication of the Bureau of Mines has discussed the marketing of salt. The present paper deals with the economic phases of this industry.

Acknowledgments

In preparing this paper, the author has made extensive use of publications of other Government bureaus, such as the United States Tariff Commission, Bureau of Labor Statistics, Bureau of the Census, National Bureau of Standards, and Bureau of Foreign and Domestic Commerce, as well as other divisions and files of the United States Department of Commerce, and the Trade Practice Study of the National Recovery Administration (NRA) Salt Code, by I. S. Moise and G. B. Haddock, whose work the author mentions frequently. Acknowledgment is also made to other sources of information cited in the text by footnotes.

DESCRIPTION, OCCURRENCE, AND USES

Description

Common salt, which the mineralogists term halite, is composed of sodium chloride ($NaCl$) with 60.6 percent chlorine and 39.4 percent sodium. In a natural and pure state it is colorless or white. It is commonly mixed with calcium sulphate, calcium chloride, magnesium chloride, and sometimes magnesium sulphate, with other impurities that may impart color. Much of the rock salt as mined is tinged gray, blue, brown, or sometimes pink, from its associates, and that obtained from ponds is often tinged yellow, brown, or pink from organic forms that adhere to the tiny crystals after evaporation. The color may disappear on heating.

Salt crystallizes typically in cubes, sometimes of large diameter; it is transparent or translucent or opaque in lumps; the hardness is 2.5; the specific gravity ranges from 2.1 to 2.6, that of pure crystals being 2.135; the index of refraction is 1.5442; and it is easily soluble in water — with 35.7 parts of salt to 100 parts of water at 0°C. (32°F.) and with 39 parts of salt to 100 parts of water at 100°C.

(212°F.). The mineral is a nonconductor of electricity and is highly diathermous. It is therefore used as blocks and lenses for experiments on radiant heat. The depth at which salt is found in the earth has no effect upon its physical characteristics.

The four main commercial classifications are: Vacuum pan granulated, common fine, common coarse, and rock salt. The daily use of this white mineral as table salt is so universal as to make unnecessary a description of its physical appearance in its refined state. The popular belief is that salt is hygroscopic; actually, however, only the ever-present impurities are highly moisture absorbing. The moist salt is not spoiled or rendered unfit for use, but the moisture drawn by the impurities coats the grains of salt and makes them cake into hard lumps. This happens even to table salt to which moisture-proofing ingredients have been added if kept in a moist atmosphere too long.

Occurrence

Salt occurs naturally in masses as rock salt and in solution in wells or springs, inland playas, and lakes, as well as in the sea; it is found in virtually every country in the world. It occurs most frequently as bedded deposits in sedimentary rocks, such as sandstones, shale, clay, and sometimes limestone, often interstratified with other saline materials, such as anhydrite, gypsum, sylvinite, carnallite, kieserite, and polyhalite. Sometimes petroleum is associated with it. Salt deposits occur in formations of all geologic periods. Salt is the principal solid constituent of sea water and is present in all mineral waters. Inland salt lakes, such as the Great Salt Lake in Utah, were once part of a sea. In areas surrounding such lakes are deposits that were left as residues after evaporation of the water. In many places it is buried too deep or is so inaccessible as to be commercially unworkable. Salt may also be sublimated by volcanoes, but such salt has no economic importance.

Seawater is more briny where the climate is hot and dry, as in the tropics, or when rainfall is scarce, as happens frequently in parts of coastal China. This is likewise true of inland seas. In fact, salt actually was precipitated from Great Salt Lake during the drought of 1934 to 1936.3/ The average salinity of this lake is 28 percent, but over a period of years it has ranged from 15 to 30 percent.

3/ Prof. Walter D. Bonner, of the University of Utah, and four coworkers, R. D. Twelves, G. S. Winn, George Cronkhite, and Elizabeth Sheldon, prepared an analysis of the lake, given in the paper, Chemical Studies on the Great Salt Lake, presented at the American Chemical Society meeting at Rochester, N. Y., September 1937. Tests revealed that the lake is slightly alkaline. Additional experiments revealed that water from the Great Lake contains only one-sixtieth (or less) as much bromide salts as ordinary sea water.

Uses

The uses of salt in one form or another are too numerous and diversified to be mentioned here, the most familiar being as a condiment. The greatest single application is in making chemicals, then follow food uses, which include meat packing, fish curing, dairying, processing of vegetable oils, pickling, and ice cream manufacture. Soap manufacture, leather processing, paper making, glass and ceramics (particularly for ceramic glazes), fertilizers, textile processing, dyes, artificial silk, refrigeration, case-hardening in steel mills and other metallurgical processes, water purification, and water softening all consume varying quantities of salt. It is also an ingredient of insecticides and herbicides and is used for cattle licks.

New uses developed in the last few years include stabilizing of clay and gravel secondary roads that have successfully passed through cycles of wetting and drying. Numerous articles and descriptions of such roads have been published in the last 10 years, and a few of them are noted.[4]

In the last decade salt has gained notice in diet and as a medicinal aid to man. Although even in the aggregate its use is relatively small, eminent physiologists have given a great deal of attention to salt in the diet of workers in deep hot mines, at steel mills, and on the Government project at Boulder Dam. Men working in hot places were prone to heat cramps, due to excessive perspiration and consequent execretion of salt from the body, but it was found that if a small quantity of salt were added to each glass of water consumed the salt balance could be maintained in the body. Many companies now place salt tablets near the drinking fountains for use of their employees in hot weather or where high temperatures are maintained in the working places.

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[4] As early as 1907 the U. S. Department of Agriculture brought out a report on the use of salt on roads; and in 1908 and 1909, in Florida, sea water was used to settle roads of calcium carbonate. Only a few of the later reports regarding experimental roads are listed, as follows:

Dominion Bureau Statistics, Salt: Canada, 1932.

Robbins, C. A., Common Salt in Highway Construction and Maintenance: Jour. Canadian Inst. Min. and Met., July 1936, p. 284.

Ries, H., Use of Sodium Chloride in Road Stabilization: Am. Inst. Min. and Met. Eng. Tech. Pub. 721, February 1936, 8 pp.

Looker, C. D., Some Recent Developments in the Use of Sodium Chloride (Common Salt): Am. Inst. Min. and Met. Eng. Tech. Pub. 723, February 1936, 10 pp.

Public Roads Journal, issues of February 1935 and May 1936.

Reports of the Salt Soil Bureau, Hutchinson, Kans.

Hogentogler, C. A., and Willis, E. A., Stabilized Soil Roads: Public Roads, vol. 17, no. 13, May 1936, p. 61.

Second Progress Report of Subcommittee on Treatment with Sodium Chloride: Highway Research Board, Div. of Eng. and Indust. Research, National Research Council, 1936.

Mann, J. L.: Min. and Ind. Mag., July 16, 1937.

A new method is reported[5] of using salt and ice to make thin ribbons of eutectic ice. It is said[6] that about 2 1/2 pounds of such ice gives the same refrigerating effect as 1 pound of solid carbon dioxide and that under certain conditions the salt ice may compete with mechanical refrigeration, even when the brine is not reclaimed. This ice is a frozen brine with a melting point of minus 6°F. diluted to contain 23.3 percent salt and 76.7 percent water. It is being produced in commercial quantities. In his paper Dr. Looker has cited a number of other new uses of sodium chloride.

Salt is a constituent of many fertilizers because it is a natural associate of lower-grade potash salts. However, the idea of using salt deliberately as a fertilizer recurs from time to time and has been agitated again within recent years. Chemists have said that the action of salt would depend upon the constituents of the soil and upon crops to be raised. The use of salt to release potash in the soil, and also as a possible substitution for potash has been considered. A report[7] on Salt as a Fertilizer, published in France in 1933, summarizes the matter abroad and concludes that while salt may be useful in certain instances, salt as such is not to be added but rather should be allowed to remain with its associates in potash fertilizers, such as kainites. A Canadian report[8] on salt comments as follows with regard to salt as a fertilizer:

> Sodium chloride has been used for many years as a fertilizer for certain classes of crops, such as grains, peas, hops, potatoes, turnips, clover, grasses, etc., with highly beneficial results. The amount recommended to be used per acre will vary according to the type of soil and the class of crop but will run from 700 pounds for light soil to as low as 300 pounds for heavy loam. It has also been found beneficial to fruit trees when placed in trenches around each tree.

That there are users of salt for truck gardening is evidenced by correspondence in the NRA files. In the spring of 1934 a Middle West truck gardener had difficulty in obtaining "fertilizer salt" to release potash in the soil, necessary to his produce. In past years he had used this "fertilizer salt" - a cheap grade of refuse salt such as is also sold to steel mills, to ceramic manufacturers, and to railroads for use on tracks, etc.

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[5] Canadian Chemistry and Metallurgy, Salt Ice: Vol. 19, no. 8, August 1935, p. 23.

[6] Looker, C. D., Work cited in footnote 4.

[7] Groud, Ch., Le Sel (chlorine de sodium) considere comme engrais: Phosphate et engrais chim., vol. 42, No. 157, Paris, Feb. 1, 1933, pp. 34, 35.

[8] Cole, L. Heber, The Salt Industry of Canada: Canadian Dept. of Mines, Ottawa, 1930, p. 92.

Large amounts of asparagus are grown in salt water in coastal areas, and H. I. Smith (Geological Survey) told the author of this paper of an inland grower who claimed he used as much as a ton of salt every year on his asparagus field.

Salt-seasoning of lumber has been studied intensively during the last 3 years by the Forest Products Laboratory, Forest Service, United States Department of Agriculture. The laboratory tests seem to prove the value of the salt method, but it must still be tested commercially. Meanwhile, the laboratory is continuing to develop special methods of salt-seasoning different species and items of American woods. Merely soaking green wood in an aqueous solution of common salt, alone or combined with sodium sulphate, hastens the seasoning greatly. Moreover, it obviates checking and thus yields usable timber from many trees that hitherto were deemed unsuitable for structural use.9/

A wide field of indirect uses was opened by the electrolysis of salt. A recent paper10/ describes the uses of three products after a direct current has been passed through the salt solution in modern cells. The sodium hydroxide or "soda lye" is used for many purposes but chiefly in the manufacture of soap and rayon. The chlorine gas is compressed in cylinders and shipped for use as a bleaching agent, chiefly for bleaching cloth and wood pulp used for fine papers. The hydrogen is used in the manufacture of ammonia by another interesting process. It is passed, with air, through a special burner and made to combine with the oxygen, which leaves the nitrogen more or less pure. This nitrogen is then mixed with more hydrogen, and by the Haber process these two are combined to form ammonia. The ammonia is used in refrigeration, can be oxidized to form nitric acid, or can be combined with sulfuric acid to form ammonium sulphate, an important fertilizer.

Heavy chemicals account for most of the brine consumed, chief among them being the alkali group - soda, caustic soda, and other sodium chemicals. Chlorine has many more uses than formerly; for a time it was unsalable. Chlorine is now used chiefly in paper making; textile-processing also takes a good share, although smaller amounts of chlorine are consumed in purifying water, this is one of the most important uses, consuming quantities in every great city, especially in the thickly settled East. Chlorine is used for sterilizing creamery equipment and milk and cream bottles.

9/ Loughborough, W. K. (senior engineer, Forest Products Laboratory, Forest Service, U. S. Dept. Agriculture), Chemical Seasoning of Wood: Southern Lumberman, Sept. 15, 1936. Chemical Seasoning of Douglas Fir: Southern Lumberman, Jan. 15, 1938.

10/ Bigelow, H. E., Some Chemical Industries Dependent on the Mining Industry: Bull. Canadian Inst. Min. and Met., January 1937, p. 34.

Dr. W. C. Phalen (in a letter to the writer) says: "The production of chlorine from salt without caustic soda is becoming increasingly important to chemical manufacturers. F. W. DeJahn[11] has given the reasons for this."

Part of the increasing demand for chlorine has been due to the greater demand for chlorine compounds as solvents in oil refining and dry cleaning and as refrigerants, as indicated by D. H. Killeffer.[12] Chlorinated solvents are of particular advantage to the dry-cleaning industry because they reduce the fire hazards and, consequently, insurance rates.

Modern rubberlike materials are made from salt. A new factory for such material (made now in New Jersey) has been erected in Michigan by the Dow Chemical Co; this will utilize the raw material close at hand.

Chlorine is used in making the resin for some of the plastics that have been invented in recent years.

WORLD PRODUCTION

The United States leads in the production of salt, having contributed 28 percent of the total world output in 1935, while in 1936 it produced more than 30 percent. In the 19th century world consumption, and consequently production, increased greatly, chiefly because new uses for salt were discovered and new processes for utilizing it were developed in the chemical industry. The radical change that has taken place in the type of fertilizers used, replacing natural fertilizers with inorganic fertilizers, has increased requirements for salt derivatives used in conjunction with other minerals. The new uses of salt for chlorine and for dry salt have necessitated greater production.

In a great many foreign countries, particularly the older nations, the Government has a monopoly or exacts a tax on salt. Owing to the almost universal use of salt, such a tax was deemed to be the most all-inclusive form of taxation. That such tax falls on all classes cannot be denied, but whether it bears down more heavily on certain classes is another question that at various times has caused serious uprisings among the poorer peoples where such imposts are exacted.

The Enclyclopedia of Social Sciences[13] lists the fiscal salt monopolies of Europe before the World War as follows: Italy, Austria-Hungary, Serbia, Russia, Greece, and Turkey, to which new monopolies were added after the war in Poland, Yugoslavia, and Czechoslovakia.

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[11] DeJahn, F. W., Is there a Profit in Chlorine and Nitrate from Salt?: Chem. and Met. Eng., October 1935, pp. 537-38.

[12] Killeffer, D. H., Chlorinated Solvents in Dry Cleaning: Ind. and Eng. Chem., June 1936, p. 640.

[13] Public Monopolies, vol. 10, p. 620.

Original from THE OHIO STATE UNIVERSITY

Some foreign countries impose a tax on table or dairy salt and, to prevent evasion of such tax by substitution of other salt for these purposes, require that commercial salt be prepared under Government supervision and that it be denatured by adding substances that make it objectionable for table use, the denaturing ingredient selected depending upon the commercial use to which the salt is to be put.

The world's annual salt output is about 26 million metric tons. Most of it is mined for domestic consumption in the country producing it. A few countries, however, produce a considerable surplus for export, among them being the United Kingdom, with almost 20 percent, and China, with more than 19 percent of their outputs exported.

DOMESTIC PRODUCTION AND CONSUMPTION

About 8 1/2 million tons of salt is mined annually in the United States, and almost all of it is consumed at home. Exports amount to a little more than 1 percent and imports about 1 percent of domestic production, virtually offsetting each other.

During the last three decades the increase in amount of salt produced has exceeded the increase in population. Per-capita consumption trends, by 5-year periods and for 1935 and 1936, are shown in the accompanying table. In 1936 the per-capita consumption was 70 percent more than in the 1910-14 period. Analyzing further the various half-decade periods, we find some abnormality in 1915-19 due to the World War requirements of chlorine for chemical warfare gases and of salt for other necessary chemicals, medication, meat preservation, etc. Even during this period, however, new uses discovered through war research were being adapted to the peaceful arts. Although consumption for such purposes declined in the 5 years after the war it did not shrink to the pre-war proportions. The next 5-year period, 1925-29, includes the heyday when consumption of all commodities zoomed to a new high peak. Naturally, with the depression, which came in the next period, 1930-34, a drop occurred, but even so this average is not quite as low as the nearest previous low average. It increased in the next year (1935) and climbed to a new high record in 1936. The gains for 1935 and 1936, aside from population increase and consequent production increase, are attributable to the increased use of dry salt for stabilizing roads and of brine salt in chemicals, chlorine for paper-making, textiles, etc.

In 1900, salt production was 2,921,708 short tons; in 1936 it had more than trebled, amounting to 8,828,936 tons. The accompanying table gives the salt production by method of manufacture for the last 11 years.

Original from THE OHIO STATE UNIVERSITY

United States per-capita consumption of common salt, 1910-34, by 5-year averages, and 1935 and 1936

Period average	Total domestic production, short tons	Value	Dry or 1/ commercial production, short tons	Salt in brine, short tons	Net 2/ imports(+) or exports(-), short tons	Total apparent consumption, short tons	Per-capita consumption, pounds
1910-14..	4,592,516	$9,193,873	3,074,381	1,518,135	+78,339	4,670,855	97
1915-19..	6,563,028	19,869,825	3,970,440	2,592,588	-21,991	6,541,037	128
1920-24..	6,509,572	27,091,974	4,056,095	2,453,477	-45,453	6,464,119	118
1925-29..	7,791,210	26,028,520	4,525,142	3,266,068	-91,282	7,699,928	130
1930-34..	7,415,381	22,237,494	4,081,990	3,333,391	-48,960	7,366,421	119
1935.....	7,926,897	21,837,911	4,089,284	3,837,613	-60,967	7,865,930	124
1936.....	8,828,936	23,306,177	4,549,176	4,279,760	-25,934	8,803,002	138

1/ Represents evaporated and rock salt.
2/ No salt in brine; only commercial salt in foreign trade.

Salt sold or used by producers in the United States, in short tons, 1926-36, by method of manufacture

(From statistics furnished by A. T. Coons, Bureau of Mines)

Year	Evaporated in grainers	Evaporated in vacuum pans	Solar evaporation	Pressed blocks from evaporated salt	Rock salt	Pressed blocks from rock salt	Salt in brine (sold or used as such)
1926..	693,140	1,055,310	323,940	125,670	2,106,850	28,870	3,037,820
1927..	703,970	1,097,390	311,530	150,140	2,109,440	34,420	3,161,800
1928..	710,400	1,193,560	380,370	145,720	2,182,850	34,930	3,426,870
1929..	771,400	1,201,560	401,310	172,120	2,072,090	40,920	3,884,160
1930..	707,330	1,163,630	353,080	134,570	1,935,220	42,150	3,718,460
1931..	589,130	1,158,190	326,500	129,870	1,819,700	34,470	3,300,210
1932..	592,340	1,073,153	268,690	119,238	1,558,227	26,504	2,769,821
1933..	573,240	1,310,676	322,368	152,670	1,754,487	30,505	3,461,026
1934..	541,392	1,267,157	333,459	139,445	1,883,838	29,344	3,417,439
1935..	466,327	1,390,587	347,123	126,005	1,734,551	24,691	3,837,613
1936..	595,143	1,457,364	352,504	134,586	1,975,090	34,489	4,279,760

Michigan is the leading salt-producing State, followed by New York, Ohio, Kansas, Louisiana, California, Texas, Utah, and West Virginia, in the order named. Outputs of these nine principal States during the last 11 years are shown in the following table.

For evaporated salt only (including salt from natural brines or brine from rock-salt beds and blocks of cattle salt from evaporated salt) Michigan again comes first, followed by Ohio, New York, California, and Kansas. In 1936 the evaporated salt produced was 29 percent of the total salt production.

New York, Louisiana, Kansas, and Michigan together produce over 90 percent of all rock salt mined in the United States. In 1936 rock salt produced represented 23 percent of the total salt output.

Brine for chemical manufacture was produced in Louisiana, Michigan, Ohio, Texas, and Virginia and represented 48 percent of the total salt output in 1936.

Consumption Trends

A previous table has shown that the per-capita consumption has increased over a period of 27 years. Taking a larger view and observing the proportion of domestic consumption to production, apparent consumption has almost equaled domestic production. The following is quoted from an analysis of consumption of salt by the Tariff Commission.[14]

> The consumption of salt in the United States has doubled since 1900. This increase is due not only to the increase in the population of the country but also to the increase in the production of the chemical products using salt as raw material. The greatest increase is shown from 1915 to 1916, during which time the consumption increased over 1,000,000 short tons.
>
> In 1900 the domestic production amounted to 93.9 percent of the consumption and since has increased steadily, until in 1914 it amounted to 99 percent of the consumption, an increase of 5.1 percent.

Carrying this farther, in subsequent years this percentage increased until in 1935 it was 99.2 and in 1936 it was 99.71.

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[14] Tariff Information Survey FL-22, 1921.

Salt production (in short tons) by leading States

(Statistics compiled by A. T. Coons)

	1925	1926	1927	1928	1929	1930
California.........	292,480	288,440	300,880	383,730	410,300	350,370
Kansas.............	812,540	729,880	794,780	821,950	840,370	759,800
Louisiana..........	500,350	520,400	606,110	630,780	525,840	535,250
Michigan...........	2,172,600	2,260,320	2,271,460	2,405,240	2,650,220	2,558,290
New York...........	2,053,970	2,001,580	1,964,080	2,085,230	2,194,590	2,009,280
Ohio...............	1,173,590	1,164,400	1,203,170	1,308,110	1,449,360	1,311,440
Texas..............	(x)	(x)	54,270	(x)	(x)	(x)
Utah...............	88,150	77,350	74,690	(x)	84,940	85,240
West Virginia......	25,870	23,180	22,600	18,700	20,290	28,670
Undistributed 1/...	277,950	306,050	276,650	335,160	367,650	416,100

	1931	1932	1933	1934	1935	1936
California.........	334,900	281,349	331,009	341,893	356,222	368,290
Kansas.............	691,160	648,800	732,947	768,133	608,204	704,164
Louisiana..........	529,280	488,805	532,569	567,289	702,990	918,414
Michigan...........	2,053,980	1,715,304	2,090,254	2,012,370	2,128,171	2,354,282
New York...........	1,788,940	1,556,642	1,847,696	1,866,280	1,927,822	2,021,983
Ohio...............	1,398,000	1,196,993	1,382,294	1,432,292	1,487,315	1,633,056
Texas..............	103,040	139,730	165,603	208,979	268,809	316,006
Utah...............	74,010	61,230	56,305	(x)	57,625	56,480
West Virginia......	35,480	49,629	63,818	66,766	65,968	117,401
Undistributed 1/...	349,280	269,491	402,477	348,072	323,771	338,860

1/ Including Puerto Rico, Virginia, Nevada, Idaho, New Mexico, and Texas and Utah where marked (x).

In figure 1 of the chapter on Salt in Bureau of Mines Yearbook 1937, salt consumption-production is compared with the index of industrial activity in 1919-36. If the average annual salt production for 1923-25 is taken as 100 and is compared with the Federal Reserve Board index of general business, the curve of production of all kinds of salt closely follows the index of general industrial activity for a number of years. Salt production remained relatively high during the depression (at the lowest point in 1932 the index was 26 points above that of general business) and climbed to an all-time high in 1936. The dry salt curve, which is relatively inflexible because of the large quantity used by the food industries, lagged behind the index of general business from 1925 to 1929 but did not drop so low during the depression years. Although shipments increased in 1936 compared with 1935 the output of dry salt was less than the 1929 peak, and the index fell slightly below that of business in general.

IMPORTS AND EXPORTS

At the turn of the century the refining of salt in the United States had improved so materially in quality, along with the establishment of mass production, that to a great extent domestic salt replaced importations from Europe and moreover enabled this country to compete successfully in foreign commerce.

Imports

Whereas in the 19th century imports of salt sometimes rose to 500,000 short tons, at the beginning of the present century they dropped to 155,946 tons and in 1936 amounted to only 51,040 tons.

Crude salt predominates in the imports because its chief market (about half of the total of all kinds) is the fishing industry along the seacoast, particularly the Atlantic seaboard, near which there is no natural source of salt of commercial size. Crude salt is also imported in bulk for other industrial uses. In recent years bulk-salt imports have increased, although total salt imports have decreased steadily. The aggregated salt imports are received from Spain, Canada, Algeria and Tunisia, West Indies, United Kingdom, Germany, France, and Egypt.

Tariff History

Salt has been mentioned specifically in 23 tariff acts, beginning with the first in 1789, which levied a duty of 6 cents per bushel on all salt, and including the act of 1930, which is still in force.

In only two acts was the duty taken off entirely - the acts of 1894 and 1913 placed salt on the free list.

The duties levied in other acts have ranged, for the entire period, from 6 cents a hundred pounds to 20 cents a bushel (approximately 36 cents a hundred pounds) for both bulk and packaged salt.

Under the acts of May 2, 1792 (effective June 30), the bushel was defined as containing 56 pounds.

It was not until the tariff act of March 2, 1861, that any differentiation was made between the rate for bulk salt and that for packaged salt - 4 cents a bushel on the former and 6 cents a bushel on the latter. In that same year, under the act of August 15, the unit system was changed from bushel to hundred-weight, which has remained in all subsequent acts.

The duty rates of 7 cents for bulk salt and 11 cents for packaged salt applied in the act of 1922 and that of 1909 prior to salt being placed on the free list by the tariff act of 1913. The specific duty on salt for many years before 1913 (except that used for curing fish and packing meats) was equivalent to an ad valorem duty of about 50 percent.

It may be added that a court and treasury decision ruled that sacks containing salt exempted from duty are not dutiable (Karthaus v. Frick, 14 Fed. Cas. 136). The present (1930) act provides as follows:

> Salt imported in bulk, 7 cents per 100 pounds. Salt imported in bags, sacks, barrels, or other packages, duty of 11 cents per 100 pounds. (a) Imported salt for curing fish: Imported salt in bond[15] may be used in curing fish taken by vessels licensed the engage in the fisheries, and in curing fish on the shores of the navigable waters of the United States, whether such fish are taken by licensed or unlicensed vessels, and upon proof that the salt has been used for either of such purposes, the duties on the same shall be remitted. (b) Exportation of meats cured with imported salt: Upon the exportation of meats, whether packed or smoked, which have been cured in the United States with imported salt, there shall be refunded, upon satisfactory proof that such meats have been cured with imported salt, the duties paid on the salt so used in curing such exported meats, in amounts not less than $100.

Exports

Previous to 1917 imports of salt into the United States always exceeded exports, but in that year the latter turned sharply upward and the trade balance has since favored the United States. In the decade 1926-35 the exports were double or treble the imports, but in 1936 they declined considerably. Possibly this decrease is attributable in part to the size of the previous year's salt exports, which exceeded those in 1929. In recent years the exports have gone chiefly to Canada, Japan, Cuba, and Russia.

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[15] Although not defined in the act, "in bond" means: The state of goo being manufactured, stored, or transported under the care of bonde agencies until the duty on them is paid or goods are exported.

The salt exported has a higher value than that of the salt imported due to the fact that the exports are of higher-grade salt, chiefly table salt; however, the difference is much less than a comparison of average unit values might indicate, owing to the fact that imports are valued f.o.b. foreign port of shipment and thus do not include freight and other charges incident to bringing them into the American market.

ORGANIZATION OF DOMESTIC INDUSTRY

The general trend toward fewer but larger producing units has been marked in the salt industry. In 1880, 268 salt plants reported operation to the Bureau of the Census. Notwithstanding the steady increase in aggregate production, the number of active plants dropped to 161 in 1897, 136 in 1911, 97 in 1925, and 74 in 1935. In 1936, a record year in production, only 72 plants were active.

Of the 58 companies operating 72 plants in 1936, 7 large companies, including producers of evaporated salt, rock salt, and brine, produced about 47 percent of the total, 16 medium-size companies produced about 44 percent, and the remaining 35 small companies produced 9 percent.

Expansion by some of the companies is explained in part because it spreads overhead cost over a larger volume of production. Certain kinds of salt-making equipment are expensive and deteriorate rapidly. Idle equipment is more subject to corrosion, and this factor also tends to explain why profit sometimes may be sacrificed to avoid a shut-down.

Production facilities in this industry have been chronically overbuilt, the industry as a whole frequently operating at less than 50 percent of maximum capacity.

Winning salt by solar evaporation of sea water requires large acreages, not only near the source of supply but also near consuming centers, and must be done on a large scale to be profitable. For these reasons a number of small producers in some localities have consolidated into one company.

The larger salt producers have plants in more than one district. A decided cause for the reduction in number of individual companies or plants operating has been the entry into the producing field of chemical companies using salt brine as their basic raw material. With this industrial market removed, those producers who specialized in furnishing the brine were poorly equipped with facilities to produce dry salt and with sales organization and experience to enter into competition in other markets - table salt, for instance. Such plants either shut entirely or were absorbed by other manufacturers. At present the majority of such chemical companies produce their own brine requirements. Others would buy on a contractual basis and would not affect the dry salt market.

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The average number of wage earners employed in the salt-producing industry, based upon Bureau of the Census statistics, was 5,818 in 1925-33. Two of the largest producers employ about one-third of the wage earners in the industry in their several plants. About 50 percent of the volume of production is centralized in Michigan and New York.

The Census of Manufacturers for 1929[16] shows that no plants employ more than 500 workers, and only a few employ less than 20 workers. The number and size of the 58 salt establishments, by number of wage earners reported in 1929, are given in the following, taken from the Abstract of the Census of Manufacturers (15th Census).

No. of wage earners to an establishment	No. of establishments	Employing total wage earners
1 to 5	3	8
6 to 20	8	91
21 to 50	14	481
51 to 100	15	1,097
101 to 250	14	2,288
251 to 500	4	1,490

The summary of establishments, classified by value of the products and the wage earners employed, taken from the same Census abstract, is as follows:

No. of establishments	Wage earners employed	Value of products
3	29	$47,000
9	119	513,000
20	930	5,142,000
12	1,180	7,984,000
14	3,200	24,183,000

A summary from the same abstract, in which the establishments are classified by type of ownership, showed that in 1929, of the total 58 establishments 53 were corporations that employed a total of 5,337 wage earners (average for the year) and manufactured products valued at $37,315,567, and the remaining 5 were individuals, partnerships, etc., that employed 121 wage earners (average) and manufactured products valued at $553,130.

Seasonal changes are not greatly significant in the salt business. Local conditions, such as the existence of canneries that consume quantities of salt in their canning season or the increase in amount consumed in curing fish in the fishing season, may affect consumption in some parts of the country at times, and the rainy season on the West

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[16] Fifteenth Census, 1929, vol. 1, pp. 68-69.

Coast may influence the production of solar salt, yet the variation over the entire year for the entire country is small. The 4 months when, for the country as a whole, the most salt is produced are August, September, October, and November. The Bureau of Mines collected statistics on the monthly employment in the salt industry in 1935, and no startling rise or fall in employment is shown by the statistics; employment is comparatively steady.

The great consuming industries, such as the meat-packing, tanning, textile, dairying, and paper industries, and, above all, food-preparing industries, are stable in their demands, so that, as a whole, the market flow in the dry-salt industry is relatively steady in the various areas of the United States.

In respect to actual markets and deviation from the natural paths, several variations should be noted. The Chicago market naturally is fed by the Michigan producing field, but there are some industries in this market that get their supplies from outside the Michigan area. Two Chicago meat-packing industries are supplied wholly from their own joint mine in the Kansas producing field; and a food company, some of whose factories are in the Chicago salt-marketing area and some scattered in various other parts of the United States, gets most of its salt from its own works in Michigan and Kansas.

Entrenched buying habits and apparent prejudices also influence salt distribution. Certain meat packers in the West, for example, demand a certain type of eastern salt. Until production of solar salt near Syracuse, N. Y., was discontinued in 1927, some Chicago meat packers felt that this salt was necessary in their meat packing, although excellent salt could be obtained cheaper locally. In the Far West are dairymen who will not use salt from around the Great Salt Lake but demand the salt of the Middle West - the Michigan field - claiming that it is better for their purpose.

In recent years, some of the chemical manufacturers have built plants in the Louisiana and Texas producing fields. Demand for chlorine for kraft-paper making has increased with new developments in the paper industry in these fields.

A world shortage of salt is unthinkable; it is found in so many places and in such tremendous quantities. In addition to the numerous deposits that now supply our salt, there are many deposits that are too remote from markets or too deeply buried for present economic exploitation. The main economic problem is distribution, and this affects every phase of the salt industry. Phalen has described the situation as follows:17/

17/ Phalen, W. C., The Marketing of Salt: Eng. and Min. Jour.-Press, Jan. 27, 1923, pp. 185-190.

In the case of a low-priced commodity like salt, sales territory is limited largely by freight rates, and hence prices must be kept down to the lowest point. There is an area around each production center outside of which freight rates are so great that competition from other centers of occurrence and production become first a limiting and then a deciding factor. This, of course, is why the production of salt has become so widespread in the United States.

The Michigan field, blessed though it was from start of development with a strong brine, cheap fuel (the waste lumber and exhaust steam of the lumber mills), and good natural markets, had difficulty in marketing its product at one time. To cope with this situation, about 50 years ago the salt producers of that State formed the Michigan Salt Association, of which the majority of salt manufacturers of the State were members and through which most of the salt was marketed. The association built its own railroad to take salt from the Saginaw Valley to Chicago, one of its main distributing centers. Some of the members of this original association are still engaged in the salt trade.

The present most important organization of the kind is the Salt Producers Association, which has headquarters in Detroit, Mich. It was formed in 1914 and was incorporated under the laws of Delaware in February 1934. When first formed, it had a membership of 20 producers of evaporated salt, whose output was about three-fourths of all evaporated salt produced. It did not include either rock-salt producers or those who produced salt in brine for their own chemical plants. However, during the life of the National Recovery Administration, rock-salt producers joined the Association, which sponsored the NRA Salt Code. In a public hearing of the NRA in August 1933, the association reported that its members produced 90 percent of all salt sold as such in the United States.

Amplified in the bylaws of the association, its purposes are to preserve the standard quality of salt manufactured for certain and specific industries, to cooperate with customers in an effort to eliminate unfair and fraudulent practices and methods, to standardize as far as possible the method of calculating costs, to discover and assist in promulgating new uses for salt, to preserve friendly relations between producers, and to obtain, by open discussion, accurate information with respect to the management of the business and the needs of the trade for the benefit of the industry, the trade, and the public. The bylaws stated:

> It shall be thoroughly understood by the members of the Association that all information reported to the Association or distributed by it, is purely statistical and pertains only to past and closed transactions, and that no part of the machinery of this Association will be permitted to be used to fix prices for the sale of goods, or to divide the territory, or to limit the production or manufacture, or

limit or control competition; and no information shall be collected or distributed respecting any prices which any member intends or expects to ask, except to the extent that any of the matters in this paragraph (6) shall be permitted by law.

The association has the following standing committees:

Transportation. - This committee furnishes the secretary's office with freight rates compiled for all shipping points in the territories supplied with salt by members of the association.

Simplified Practice and Standardization. - This committee's functions are to establish and adopt recommendations for simplified practice and standardization of all salt packages, to reduce wastes resulting from an unnecessary variety of packages or classification in the marketing of salt.

Trade Relations. - The functions of this committee are to keep the association informed of trade developments and to offer recommendations with respect to those that promise to benefit the industry, trade, and consuming public.

As for membership, "all persons, firms, or corporations, engaged in the production and distribution of salt in the United States shall be eligible for membership."

The members are expected to inform the association regarding their salt shipments, stocks, sales, classification, movements, uses of various products, and any other trade news, and upon such information are based the secretary's statistical reports to members.

MARKET AREAS

For commercial salt there are 10 principal market areas, all of which, except Oklahoma, have long been recognized as natural self-marketing territory. These areas (except Oklahoma, whose output is reported under "Undistributed" as it cannot be disclosed separately) correspond roughly to the chief producing States as reported by the Bureau of Mines. They were defined more specifically in a circular issued by the Salt Producers Association in September 1933, subsequent to adoption by the NRA Code Committee, as follows:

Natural Marketing Territory

NEW YORK

New York
New Jersey
Delaware
Pennsylvania (except Star Points)
New England
Maryland
District of Columbia
Accomac and Northampton Counties, Va

OHIO

Ohio
Pennsylvania Star Points
Virginia (except Accomac and Northampton Counties)
West Virginia
Kentucky Star Points

MICHIGAN

Michigan
Illinois
Indiana (except New Albany and Jeffersonville)
North Dakota (except Star Points)
Wisconsin

MICHIGAN-KANSAS

Iowa
South Dakota
North Dakota Star Points
Minnesota
Northern Missouri

KANSAS

Kansas
Southern Missouri
Nebraska
Colorado Star Points
Wyoming
New Mexico

OKLAHOMA

Oklahoma
Arkansas - that part of the State which is north of the south boundary li of the following counties: Polk, Scott, Yell, Perry, Faulkner, White, Woodruff, Cross, Poinsett, and Mississippi.

TEXAS

Texas

UTAH

Idaho (except northern part)
Montana
Wyoming (except Star Points)
Nevada (except western part)
Utah
Colorado (except Star Points)

CALIFORNIA

California
Oregon
Nevada, western part
Idaho, northern part
Arizona
Washington

LOUISIANA

Louisiana
Mississippi
Alabama
Georgia
Florida
South Carolina
North Carolina
Kentucky (except Star Points)
Jeffersonville and New Albany, Ind
Tennessee
Arkansas - that part of the State is south of the south boundary li of the following counties: Polk, Yell, Perry, Faulkner, White, Woo Cross, Poinsett, and Mississippi.

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The foregoing marketing areas are natural freight territories and also correspond closely to the production areas, except the Michigan-Kansas area, which produces no salt. The New England States and the Lower Atlantic Seaboard States likewise produce no salt, but in the industry's classification they are included in the New York area as the nearest producing area, although they are also served by foreign sources. At times the Pacific Coast area, too, has been served by imports, although normally it is supplied by California. Seattle, in particular, being a coastal industrial city that employs salt for curing fish, sometimes uses foreign salt.

Although the amount consumed is the same, the shift in activity of the fishing industry to the Virginia capes has altered the relative importance of the leading markets for imported salt for curing fish, so that in 1936 the Virginia fish-salt imports almost equaled the combined receipts of the two customs districts, Maine-New Hampshire and Massachusetts.

Taking averages from the accompanying table of salt shipments by States of destination for 1931-36, it is apparent that New York received the largest total of both evaporated and rock salt, the average annual amount being 440,012 short tons. Illinois ranked next, with receipts of 337,564 tons, then California, with 213,750 tons, and Michigan, with 212,556 tons; Texas was next, with 158,971 tons, and finally came Kansas, with 144,290 tons. When separated according to types of salt, the order was as follows: In evaporated salt, Illinois led with average annual receipts of 203,868 tons, followed by California, 202,698 tons; Michigan, 178,688 tons; New York, 167,622 tons; Texas, 48,217 tons; Kansas, 32,364 tons. New York led in rock-salt receipts by a wide margin, 272,389 tons; Illinois was second with 133,696 tons, then Kansas, 111,926 tons; Texas, 110,754 tons; Michigan, 33,868 tons; and California, 11,052 tons.

A significant fact in the foregoing analysis is that Illinois, which did not produce any salt, was at or near the top in receipts in every instance. It led in receipts of evaporated salt and was second in receipts of rock salt and in total salt receipts. One reason for this is that Chicago is the largest railroad center in the world and is a distributing point for many commodities from various sections of the country. Another equally important reason is that it is a large food market center and has other important salt-consuming industries. In this connection it must be mentioned that this table of distribution does not consider interstate shipments for secondary warehouses; however, it indicates actual consumption.

Distribution (shipments) of evaporated and rock salt in the United States, 1931-36, by States of destination, in short tons

Destination	1931		1932		1933
	Evaporated	Rock	Evaporated	Rock	Evaporated
Alabama	7,995	28,725	6,653	27,812	7,028
Arizona	6,428	3,018	4,739	2,249	6,320
Arkansas	8,295	19,950	7,470	19,760	15,757
California	198,447	15,121	184,829	12,091	183,926
Colorado	25,348	11,059	19,109	9,818	16,249
Connecticut	6,517	6,205	12,060	3,117	12,751
Delaware	2,325	61,938	3,140	7,254	4,299
District of Columbia	2,993	2,657	4,674	1,921	4,448
Florida	3,969	22,371	3,967	17,583	4,261
Georgia	10,074	34,659	10,934	33,648	12,130
Idaho	12,783	733	12,049	527	10,706
Illinois	191,540	151,676	183,799	122,831	213,838
Indiana	52,859	53,136	51,363	46,316	64,458
Iowa	56,752	59,383	57,852	62,309	66,820
Kansas	37,115	92,817	36,742	112,094	37,974
Kentucky	24,545	16,195	23,000	15,208	27,401
Louisiana	2,132	36,397	2,514	46,659	3,161
Maine	4,033	14,558	7,623	9,372	8,411
Maryland	13,396	18,782	20,205	14,733	23,823
Massachusetts	35,334	31,097	50,157	26,811	56,619
Michigan	140,140	31,762	124,146	27,567	195,568
Minnesota	66,890	54,423	62,854	56,724	68,574
Mississippi	2,914	28,597	2,548	25,300	2,448
Missouri	54,360	53,995	54,662	54,398	58,637
Montana	13,985	1,014	12,059	925	12,175
Nebraska	34,072	44,608	33,126	43,010	33,176
Nevada	2,689	585	2,826	276	2,126
New Hampshire	1,689	15,400	4,212	14,949	5,631
New Jersey	26,265	74,514	40,578	64,674	50,952
New Mexico	5,424	3,995	4,921	5,594	4,883
New York	130,778	258,766	155,458	221,039	174,258
North Carolina	20,811	41,075	21,206	37,826	24,612
North Dakota	8,109	1,239	10,354	1,310	10,508
Ohio	85,024	51,892	89,959	45,489	109,776
Oklahoma	20,099	16,688	19,884	19,093	34,971
Oregon	24,326	270	23,017	225	23,570
Pennsylvania	64,019	91,163	89,292	74,282	99,962
Rhode Island	4,685	6,568	7,132	5,026	6,653
South Carolina	7,415	10,062	5,686	12,239	5,974
South Dakota	12,501	9,730	10,753	11,480	12,696
Tennessee	23,524	30,828	23,973	31,550	27,721
Texas	46,980	115,932	46,043	97,010	58,889
Utah	12,050	1,298	10,917	928	10,143
Vermont	2,773	1,203	6,032	947	6,374
Virginia	27,637	13,948	32,751	12,648	35,998
Washington	50,525	438	46,575	494	50,707
West Virginia	39,527	19,705	49,768	14,360	63,686
Wisconsin	74,923	33,451	76,692	24,400	85,296
Wyoming	6,472	2,525	6,270	2,431	5,901
Other 1/	49,211	43,518	32,687	38,379	88,697
Total shipments reported	1,762,747	1,739,669	1,809,260	1,536,686	2,150,942
Total sales	2,203,690	1,854,170	2,061,215	1,616,315	2,314,068

(See footnote on following page.)

Distribution (shipments) of evaporated and rock salt in the United States, 1931-36, by States of destination, in short tons - Continued

Destination	1934		1935		1936	
	Evaporated	Rock	Evaporated	Rock	Evaprated	Rock
Alabama.............	7,293	32,582	6,080	30,620	6,463	26,302
Arizona.............	7,605	1,430	6,262	1,226	6,602	1,238
Arkansas............	12,709	15,873	9,628	15,323	4,711	18,604
California..........	205,880	9,481	220,249	6,233	222,858	7,250
Colorado............	18,152	10,923	13,996	5,948	12,026	4,506
Connecticut.........	13,517	5,343	13,091	5,134	13,716	6,629
Delaware............	3,825	1,977	2,549	13,816	3,515	32,622
District of Columbia	4,732	1,552	4,943	1,462	4,660	1,161
Florida.............	5,285	20,441	5,343	18,901	5,391	15,709
Georgia.............	11,957	38,960	12,545	39,312	13,464	35,443
Idaho...............	10,072	597	9,880	494	11,512	445
Illinois............	202,176	136,982	202,513	119,595	229,343	134,509
Indiana.............	64,572	47,318	64,999	46,582	72,519	47,126
Iowa................	61,758	71,501	49,731	58,446	48,199	57,599
Kansas..............	35,946	148,606	26,894	126,013	19,511	71,625
Kentucky............	26,249	18,809	27,949	16,596	31,463	19,127
Louisiana...........	6,201	46,081	5,278	44,838	4,396	46,951
Maine...............	8,364	15,932	8,581	14,083	9,293	20,023
Maryland............	23,598	20,260	21,623	20,315	25,357	25,004
Massachusetts.......	56,399	28,852	61,449	33,671	59,187	32,680
Michigan............	177,669	35,363	206,294	40,022	228,311	40,205
Minnesota...........	58,342	55,851	54,186	49,694	62,149	54,670
Mississippi.........	2,747	31,178	2,226	27,266	2,136	25,104
Missouri............	56,444	64,015	51,323	39,209	44,825	43,303
Montana.............	15,617	2,195	12,836	1,801	11,351	969
Nebraska............	30,985	41,579	20,478	25,232	17,655	27,059
Nevada..............	2,322	78	2,116	65	2,143	133
New Hampshire.......	5,326	23,814	5,534	26,657	7,046	27,485
New Jersey..........	48,043	65,630	53,509	85,340	67,423	104,528
New Mexico..........	4,461	6,293	5,529	2,976	2,117	6,959
New York............	162,809	285,838	188,354	292,213	194,077	325,806
North Carolina......	18,702	43,419	30,418	33,670	38,279	32,461
North Dakota........	11,691	2,246	10,117	4,577	9,441	5,361
Ohio................	105,600	58,364	123,078	52,864	140,761	64,250
Oklahoma............	28,438	20,139	23,630	16,081	14,565	16,786
Oregon..............	23,713	538	24,462	394	26,521	546
Pennsylvania........	98,814	78,522	107,278	82,360	111,029	98,736
Rhode Island........	7,411	6,119	5,956	6,871	11,640	6,821
South Carolina......	3,942	15,430	8,063	13,675	7,918	12,558
South Dakota........	12,372	10,859	11,826	9,987	9,747	10,222
Tennessee...........	26,650	40,253	21,081	38,552	19,811	33,082
Texas...............	55,694	122,349	41,244	109,779	40,454	102,601
Utah................	10,312	2,207	10,723	2,894	11,800	1,204
Vermont.............	6,145	1,279	6,232	1,409	6,167	3,386
Virginia............	36,939	13,163	46,673	12,030	43,737	20,803
Washington..........	59,893	1,611	55,278	2,169	62,607	1,471
West Virginia.......	66,049	44,373	71,466	34,921	124,412	29,987
Wisconsin...........	83,964	24,115	90,762	16,577	99,655	22,867
Wyoming.............	7,145	2,557	5,851	1,845	5,983	1,121
Other 1/............	66,924	140,305	259,936	109,504	311,651	284,542
Total shipments reported..........						
Total sales.........	2,281,453	1,913,182	2,330,042	1,759,242	2,539,597	2,009,579

1/ Includes production of Puerto Rico (evaporated salt) and shipments to Alaska, Puerto Rico, and Hawaii and to Australia, Canada, Central America, Cuba, Japan, Mexico, South America, U.S.S.R. (Russia), West Indies, and countries not specified.

Source: Compiled from annual statistics in Minerals Yearbooks.

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Based upon methods of marketing, a report[18] of the United States Tariff Commission classes salt as follows:

1. "Industrial" salt, including all, regardless of quality, which is sold primarily for industrial uses and which is shipped in bulk or in buyers' sacks, or producers' sacks, over 50 pounds in weight.

2. "Domestic" salt, including that sold primarily for household, farm, and similar domestic consumption and shipped in packages (cartons and sacks) not exceeding 50 pounds in weight, together with all salt shipped in barrels. Barreled salt is included in this group for the reason that "packets" or small bags are generally packed in barrels and there is now understood to be little shipment of loose salt in barrels.
3. Pressed blocks, usually from 50 to 60 pounds in weight, which are used mostly for cattle lick.

Industrial salt, as thus defined, comprises more than 75 percent of the total output of dry salt; domestic salt, that which is sold for household, farm, and other comparable uses, less than 20 percent; and pressed blocks sold for cattle licks, about 4 percent.

More than half of the industrial salt is sold in huge quantities to large consumers.

The marketing points for such salt are the large manufacturing cities consumption being concentrated chiefly in the New England, Middle Atlantic and East North Central States. Comprised in this area are most of the tanning establishments, textile mills, and soap factories; there is also the fish-curing industry that extends along the upper Atlantic coast southward, including the Virginia capes. Rock salt is used chiefly in this area because of its lower price. This includes some rock salt sold to chemical plants in this area.

In the Middle West, meat packing and tanning take large quantities of salt. The meat-packing industry alone in Chicago is estimated to consume one-half million tons annually; two meat companies alone use about 100,000 tons. Dairying and other food products employ huge quantities. Glass works and ceramic factories consume some. This industrial salt includes rock salt and evaporated salt. Food products require the highest grade. Heavy hides are cured with crude salt, but the finer calfskins are liable to be scarred by it, so a finer type of salt is used

Canning factories in the South (designated as the West South Central division and including Louisiana, Texas, and other States and the South Atlantic States) as well as the Middle West take great quantities of industrial salt. Milling and baking companies are consumers of large quantities of high-grade industrial salt in the Middle West. The

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[18] United States Tariff Commission, Production and Distribution of Salt in the United States by Primary Producers: Washington, March 1935,

"high-grade" industrial salt in mainly the grainer type. The canning and curing of fish on the West coast (designated as the Pacific division, including Washington, Oregon, and California) consume great quantities of industrial salt, for which certain grades of evaporated salt are used. Fish, hides, and water softening account for most of the output there.

The great Middle West is the main market for stock salt, now sold almost exclusively in blocks of both evaporated and rock salt. The Central Northeast section of the country also uses salt blocks.

In analyzing the American market the matter of competition cannot be overlooked. There is no substitute material for salt, so no other industries can compete with it. Hence, what competition occurs is from causes within the industry. Advertising may also be written off because, compared with the extent to which it is used effectively in a great many other industries, for promoting sales in the salt industry it is negligible. This is due to the stability of the total consumption and to the fact that brands of evaporated salt within the respective grades are fairly uniform. Some of the most prominent advertisers of trademarked salt doubt whether advertising is worth while. Service, in which the seller may give special accommodations and concessions, may be a competitive factor also, but final decisions generally hinge on price.

Many have considered that there is no competition between evaporated and rock salt, but the true state of affairs is obscured by the price differential. Under normal conditions these types of salt apparently do not compete; nevertheless, many industries could use evaporated salt in their processes and would prefer to do so because of the quicker solubility and greater purity of the evaporated type, but the obstacle is price. Evaporated salt costs, roughly, about twice as much as rock salt. The base price of rock salt at the works is lower, and the industries using such salt are in the East nearest to the rock-salt supplies.

The eastern salt-producing States face competition from cheap ocean-orne salt from abroad. At various tariff hearings complaints have been made that while salt imports are comparatively negligible as far as the ntire country is concerned, they are not negligible in the territory here the eastern producers must look for their market.

The natural market for the mines of western New York are the New ngland States, New York and the Atlantic coast. They cannot extend heir markets very far west, as they would come into competition with he Michigan and Kansas markets.

SALES CHANNELS AND THE MECHANICS OF MARKETING

As in other industries, different producers have different methods f marketing. In the salt industry, the manufacturer, directly or hrough a distributing agent, may sell to jobbers or wholesalers, to retailers, or straight to a consumer, as opportunity affords. By such diverse means he may discover that sometimes he is competing with himself. The various marketing steps and agencies, as understood in the salt trade, may be defined briefly.

Consumer. A buyer who does not resell. Contract consumers are those using at least 6 carloads of salt per year who contract to buy from certain producers or distributors all their salt needs for 1 year.

Broker. A supply dealer or agent who does not actually receive the salt but buys for another person or organization.

Wholesale dealer or jobber. A buyer who actually takes possession of the salt for resale. He may deal in other commodities beside salt.

Retailer. A reseller who sells the salt to consumers in relatively small quantities.

Distributor. The salt producer's agent, usually dealing exclusively in salt.

Chain stores. Single buying organizations with one credit risk, centralized control over buying, selling, merchandizing, and advertising, with wholly-owned subsidiaries, that resell the salt at retail.

Cooperatives. Cooperative buying organizations, usually of consumers. Farmers' cooperative organizations are about the most prominent. Stores that do cooperative buying in large quantities and distribute not only to members of the cooperative but frequently also to the public.

Although industry mainly regards the wholesaler as defined above, there are many concepts of the term "wholesale trade" or "wholesale distribution". This is discussed in some detail by the Bureau of the Census in its General Analysis of Volume II - Wholesale Distribution.[19]

Many salt producers sell direct to the consumers. Before the depression it was estimated that the greater part (variously estimated but thought to be about three-fourths) of the industrial salt was sold directly to consumers, the remainder through middlemen, and about half of the salt destined for household, farm, and similar uses direct to retailers, the rest through a wholesaler.

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[19] Bureau of the Census, Dept. of Commerce, Fifteenth Census of the United States (1929) published in 1930.

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The discounts given for quantity lots of the salt to consumers of ndustrial salt in reality amount to "wholesale" prices, as generally onceived.

The only basic statistics for distribution were collected and ompiled in the Census of Distribution for 1929 (Fifteenth Decennial ensus, published in 1932). The volume on Distribution of Sales of anufacturing Plants, 1929 (published in 1932), shows a further breakown of salt sales by type of customer and agency, as follows:

otal distributed sales:		
Value of sales		$37,869,000
Percent of total sales		100.0
Number of plants		58
Sales to wholesalers:		
Value of sales	$15,048,000	
Percent of total sales	39.8	
Number of plants		
Total	51	
Selling exclusively	7	
Sales to manufacturers' own wholesale branches:		
Value of sales	$329,000	
Percent of total sales	0.9	
Number of plants:		
Total	5	
Selling exclusively	-	
Sales to retailers:		
Value of sales	$ 9,973,000	
Percent of total sales	26.3	
Number of plants:		
Total	33	
Selling exclusively	-	
Sales to industrial and other large consumers:		
Value of sales	1/$12,519,000	
Percent of total sales	33.0	
Number of plants:		
Total	48	
Selling exclusively	4	

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[1] Includes $10,263,000 (27.1 percent of total sales) representing sales to manufacturers, packers, and canners; $916,000 (2.4 percent) of sales to railroads and public utility companies; and $1,340,000 (3.5 percent) of sales to hotels, restaurants, institutions, etc.

Total distributed sales – Continued:

Sales through manufacturers' agents, selling agents, brokers, and commission houses:

Value of sales	$2,096,000
Percent of total sales	5.5
Number of plants:	
Total	15
Selling exclusively	4

Sales direct to branches, wholesalers, retailers, or consumers:

Value of sales	$35,773,000
Percent of total sales	94.5
Number of plants:	
Total	54
Selling exclusively	43

Nothing was given under the heading Sales to Manufacturers' Own Retail Stores.

When the foregoing statistics are grouped differently, the distribution of salt sales by major classes of customers in the United States shows that 67 percent of the total sales was to merchandise distributing organizations, including 40.7 percent to wholesale organizations and 26.3 percent to retail organizations. The sales to wholesale and retail organizations may also be grouped into sales to controlled selling organizations comprising manufacturers' own wholesale branches (0.9 percent) and sales to uncontrolled selling organizations (66.1 percent). Although sales to industrial and other large consumers aggregated 33 percent, none was made to household consumers.

The Census data include the value of the containers, packing, etc., as well as the value of the salt. Inasmuch as most of the salt sold to retail dealers was table salt, the figure 26.3 percent must relate to packaged salt, and the percentage of the value of total sales represented by those to retail dealers accordingly would be less if it related merely to salt alone. Bureau of Mines figures are for salt alone, exclusive of cost of containers or packages; and, after the salt in brine or sold as such is deducted, the values reported for 1929 are 33 percent less than the total value as reported by the Bureau of the Census

In considering more in detail the various intermediate distributors recognized by the salt industry, the organization operates as follows:

The broker simply buys the salt for another person or organization, for which he receives a commission from the salt producer or his agent. The contract between them very often states that the broker is not to give any rebate out of his brokerage to his buyer. Brokerage commission has ranged between 5 and 10 percent, according to Census figures for

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929 quoted previously, the sales through manufacturers' agents,
elling agents, brokers, and commission houses having amounted to
.5 percent of total sales.

The wholsalers or jobbers actually receive the salt. They buy
n quantities and deal in other commodities, also, usually selling to
he retailer, although in some instances to the consumer. Their business
dvantage is buying in quantity lots, for which there may be a series of
iscounts according to the quantity and the type of salt involved in
he transaction.

The "distributor", in its narrow sense as defined previously (other-
se all participants in the stages from producer to consumer would be
nsidered as distributors), is in reality the producer's agent. He
y be a wholesale distributor with warehousing facilities, who by
ntract would be the exclusive distributor of a producer for an area;
he may be an agent who does not receive the salt or take title to it
d who merely acts as a broker. Both types of salt producers' dis-
ibutors receive special commissions and special terms. The distributor
not considered in the same class with other resellers, and he is
und by the requirement not to sell at any lower prices than those
blished by the manufacturer. The prices, etc., offered the distributors
e not published, the transactions being private. The practice of
ving such distributors seems to have been confined to the large pro-
cing companies, as none of the smaller companies are known to do
siness through this type of distributor. Some of the large companies
n their own distributing companies. The distributor also differs from
e usual wholesaler or jobber, in that he deals exclusively, or almost
, with salt, whereas other wholesalers may deal with a number of other
mmodities also.

Six months after the adoption of the NRA Salt Code, the Inter-
ional Salt Co. defined the "salt distributor" to the NRA as follows:
r classification of salt distributors is confined to buyers whose
ncipal business, or at least a substantial part thereof, is the sale
l merchandising of salt."

For example, the Eastern Salt Co., Boston, Mass., is the distributor
the International Co., being owned by the latter company. It main-
ns a warehouse and a selling organization. Not only is it the
tributor, and apparently the only distributor in that area, according
Moise and Haddock (who made a study of the salt industry at the end
the NRA) for each of the other producers in the New York producing
ld with whom it must operate under an agency contract. This situa-
n is not at all unusual, Moise and Haddock pointed out, stating:

> The Atlantic Salt Co. of Boston, is evidently the exclusive distributor in the Boston area for Ohio producers as well as that of Worcester. In Washington, D. C., the distributor is an affiliate of or under contract to Morton Salt Co., yet the Washington distributor appears to be the exclusive distributor in this area for other salt producers.

Also, one producer may sell for another, as exemplified by an arrangement that exists between two of the largest producers for the most part concentrated in different natural salt areas. One of the companies also has a plant in the area in which the other company has its largest holdings. By the business arrangement, the latter company sells for the former company all its production in the area.

Warehousing is another factor in marketing. Some of the large producers maintain branch warehouses or contract with wholesale distributors to do their warehousing and fill orders, at the same time agreeing to follow the producer's published prices and terms. Warehousing services performed by the salt manufacturers for each other are aptly described[20] by Moise and Haddock in their study, as follows:

> For example, the Worcester Salt Co., of New York, sells some of its higher grades of salt in the Middle West. It uses Morton Salt Co. warehouses to maintain a stock of salt in that area. Worcester Salt Co. salesmen, who secure l.c.l. orders or orders requiring prompt delivery, have the orders filled from the stock of salt carried in Morton's warehouses.
>
> Worcester Salt Co. salesmen may secure an order for a part of a carload of salt of the type which the Worcester Salt Co. carries in Morton's warehouse, but the buyer may wish to fill out a carload by buying cheaper grades of salt. It would not be profitable to Worcester to make the shipment from its factory, as the price on the cheaper grades of salt would not be high enough to make possible the necessary freight absorption to the Middle West. So Morton's warehouse is instructed to fill out the order with Morton's salt. Morton does not bill the buyer, as the buyer is a customer of Worcester. Instead, Morton bills the Worcester Salt Co. This is probably the reason who so many salt producers buy salt from Morton. Reference is made in this paragraph to Morton's warehousing operations. Whether the same type of operation is conducted by other producers is not definitely known.
>
> No information has been developed regarding the charges made by Morton for this service..... The terms under which the service is performed are not known, nor is it known whether or not Morton will warehouse the products of certain producers only, refusing to perform the service for other producers.

(This type of warehousing is not to be confused with the warehousing of salt by customers, which was prohibited by a section in the NRA Salt Code as being unfair practice.)

Another channel of distribution for table salt is through the chain stores. This may serve as an example of marketing from producer, or his distributor, direct to the retailer. The advantages to chain stores

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[20] Based on an interview with H. C. Mandeville, Pres., Worcester Salt Co., New York, Jan. 9, 1936.

re that they can purchase the salt in large enough amounts to obtain a
uantity discount and lower freight rates. The producer's advantages
re that he can sell large lots to an organization with central buying
ower with only one credit risk and less bookkeeping. The chain store
akes care of further distribution and advertising, if any.

Another aspect that has an important bearing on the chain store's
ility to obtain favorable prices and concessions is that a chain-store
ganization is in a position to go into the producing business if
ecessary, to supply its salt requirement.

The last channel of distribution to be considered is the cooperative
ganization, commonly called "cooperative." Probably the best known
e the farmers' cooperatives, where a number of farmers buy their farm
quirements together to obtain quantity discounts. There are also
operative stores that do their buying for cooperative members and sell
e surplus. Some independent stores do their buying cooperatively,
semble the chain stores in effect, and are known as voluntary chains.

MARKET GRADES AND SPECIFICATIONS

The two main divisions of salt on the market are evaporated salt
d rock salt. The quality and difference in grades of evaporated salt
ve been fairly well standardized by the Salt Producers Association to
cilitate marketing. The rock-salt producers of New York, Michigan,
nsas, Louisiana, and Texas have not yet agreed upon a common nomen-
ature in giving trade names to the screen sizes they produce.

Evaporated salt, the highest grade, is of three types, according
the method of manufacture: Granulated, made by the vacuum process;
lium or flake, made in grainers or open pans; and solar. Generally
aking, the faster it is evaporated the finer the size of the salt
ufactured. Vacuum pans consequently make the finest size and the
ar method the coarsest. Grainer salt is flaky and intermediate
ween these two sizes. Contrary to the popular belief, the finest and
est salt is also the cheapest kind of evaporated salt.

Evaporated Salt

According to their suitability for specific uses, the various types
evaporated salt may be grouped roughly as follows:

The granulated or vacuum type comprises the chief portion of table
t marketed and some high-grade industrial salt for food preparation.
latter may include canning, dairying, baking, and the patented flour
d prepared for cake, biscuits, etc.

The grainer type of salt, known as high-grade industrial salt, is
o used in canning and in dairying where the flaky type of salt is
ired. In baking the crackers and pretzels sold on the market grainer

salt is preferred. For making sauerkraut, a growing industry in this country, which requires 2 to 3 percent of salt of the medium-fine grade in ratio to the cabbage used, the grainer type is used much more than any other.

Solar salt has several grades. The crude grade involves the least expense and therefore is marketed at the lowest price for curing fish and meats; this grade and the next, which requires grinding and sizing, are used for industrial purposes and to some extent in place of rock salt, as used in other parts of the country, for water softening, chemical manufacture, freezing ice cream, curing hides, etc. Refined salt, which amounts to about one-third of the total, is made by dissolving the solar salt and processing it by the vacuum method. Then it is used for table and household use, dairying, baking, canning, etc.

Rock Salt

Commenting on the lack of standardization of the rock salt produced in various areas in the United States, W. G. Wilcox, chairman, Standardization Committee, Salt Producers Association, 1938, says:

> Although the relative proportions of crushed and fine salt produced by such mines (as a result of crushing the product and screening it) depends upon how the crystals cleave, and this in turn is a function or peculiarity of each deposit, these mines do not produce products which are quite comparable as to screen size.

Although no attempt is made to cite the sizes and grades of rock salt in all of the areas, a few may be given to show the variation in widely separated fields.

In Louisiana and Texas, according to W. M. Weigel,[21] the rock salt is prepared in two general classes or groups of grades - "coarse", from the coarsest grade of rock salt, about 3/4 inch to 18 mesh, and "fine", from 18 mesh to the finest marketable size, about 50 mesh. There are no exact recognized standards of size, although the same designation of size or grade by different producers represents a very similar product. The grades and corresponding limiting screen sizes are approximately as follows:

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[21] Weigel, W. M., The Salt Industry of Louisiana and Texas: Am. Inst. Min. and Met. Eng. Tech. Pub. 620, February 1935, p 6.

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Coarse grades

o. 4, through 3/4 inch on 2 1/2 mesh.
o. 3, intermediate between No. 2
and No. 4.
o. 2, through 5/8 inch on 3/8 inch.

o. 1, through 2 1/2 mesh on 4 mesh.
A" grade, through 4 mesh on 6 mesh.
C" grade, through 6 mesh on 12 mesh.
Granulated", through 10 mesh on 18 mesh.

Fine grades

Through 18 mesh on 24 mesh.
Through 18 mesh on 35 mesh.

Table, through 24 mesh on 35 mesh.

Weigel also says that "The 'granulated', usually a reground, kiln-ried product***, here placed in the coarse grades, is sometimes grouped ith the 'fine' grades."

According to information supplied by Harry M. Griffiths, vice resident, International Salt Co., Scranton, Pa., the grades and sizes f rock salt produced at Retsof, N. Y., Detroit, Mich., and Avery Island, a., are as follows:

Retsof, N. Y.

No. 2 grade

Through	On
2 inch diameter opening in plate.	3/8 (0.375) inch square 0.092 wire.

No. 1 grade

Through	On
3 (0.375) inch square opening .092 wire.	0.214 inch square opening 3 1/2 mesh 0.084 wire.

CC

Through	On
214 inch square opening 3 1/2 esh 0.084 wire.	0.104 inch square opening 6 mesh 0.063 wire.

FC

Through	On
104 inch square opening 6-mesh .063 wire.	Pan.

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Detroit, Mich.

No. 2 grade

Through	On
5/8 inch diameter opening in plate.	3/8 inch diameter opening in plate.

No. 1 grade

5/16 inch diameter opening in plate.	0.215 inch square opening 4 mesh 0.035 wire.

CC

0.215 inch square opening 4 mesh 0.035 wire.	0.107 inch square opening 8 mesh 0.018 wire.

FC

0.107 inch square opening 8 mesh 0.018 wire.	Pan.

Avery Island, La.

COARSE GRADES

No. 3 grade

Through 1 inch square.		
Over 3/4 inch mesh.	0.615 opening.	0.135 wire.

No. 2 grade

Through 3/4 inch mesh.	0.615 opening.	0.135 wire.
Over 2 1/2 inch mesh.	0.295 opening.	0.105 wire.

No. 4 grade

Through 7/16 inch opening.	0.187 opening.	0.105 wire.
Over 4 mesh.		0.063 wire.

No. 1 grade

Through 2 1/4 mesh.	0.328 opening.	0.105 wire.
Over 4 1/2 mesh.	0.159 opening.	0.063 wire.

Avery Island, La. - Cont'd.

OARSE GRADES - Continued

A

hrough 4 1/2 mesh.	0.159 opening.	0.063 wire.
ver 6 mesh.	0.126 opening.	0.041 wire.

C

hrough 6 mesh.	0.136 opening.	0.041 wire.
ver 12 mesh.	0.055 opening.	0.028 wire.

INE GRADES

Special granulated

rough 9 mesh.	0.083 opening.	0.028 wire.
er 12 mesh.	0.055 opening.	0.028 wire.

Granulated

rough 12 mesh.	0.055 opening.	0.028 wire.
er 20 mesh.	0.034 opening.	0.016 wire.

Special fine

rough 20 mesh.	0.034 opening.	0.016 wire.
er 45 mesh.	0.0132 opening.	0.010 wire.

Table

rough 24 mesh.	0.0267 opening.	0.015 wire.
er 45 mesh.	0.0132 opening.	0.010 wire.

Mine fine

erything through a 12 mesh.	0.055 opening.	0.028 wire.

About 90 percent of rock salt, comprising all grades, is used for
dustrial purposes, chief among which may be listed refrigeration,
at packing and curing, ice-cream manufacture, leather tanning, hide
lting, paper bleaching, soapmaking, glass manufacture, textile pro-
ssing, pickling, oil-clarification, and caustic-soda manufacture. A
all part only is used for domestic purposes.

Pressed Blocks

A portion of the evaporated and rock salt goes into the making of bricks. Almost no lump salt is sold for salting livestock, as blocks (of about 50 pounds each), usually pressed hydraulically, are now used. They are made of the dust or the screenings, often that spilled around the machinery and in the preparation of salt for market. The dry rock salt is crushed first. The blocks vary in color, according to the salt from which they are made or the material that is added. The white, fine, evaporated salt makes a white block. A yellow block is formed when sulfur is added (for medicinal value) to either gray or white salt before it is compressed. Sometimes potassium iodide is included for conditioning the stock. The company that buys salt from the Potash Co. of America, which is on a Government lease in New Mexico, makes blocks for cattle consumption simply by putting the salt in wooden boxes, over which is poured a brine solution; when dry, a hard solid block is the result. The compacting agent is strong brine, as plain water would make a very porous block. These blocks contain about 20 percent potash.

The description of grade-uses in the foregoing pages is not to be considered as sharply delineative. There is a great deal of flexibility in the industrial uses of the various grades, for while the requirements of some industries are necessarily very exacting (this will be discussed later) there is also much latitude in others, and in many instances the grades suitable for certain purposes are interchangeable. The most important deciding factor is price, as seen most strikingly in the industrial use of rock salt in place of evaporated salt, discussed under Market Analysis.

Specifications for table and dairy salt have been drawn by several Government agencies. Those of the Federal Specifications Board[22] for table salt are as follows:

> Quality. - Shall be of the best quality, fine-grained, crystalline table salt. Shall contain, on a water-free basis, not more than 1.4 percent of calcium sulphate ($CaSO_4$) nor more than 0.1 percent of matter insoluble in water.
>
> Method Analysis. - Chemical analysis, if required by the purchaser in the examination and testing of samples and deliveries under this specification, shall be made by the methods of the Association of Office of Agricultural Chemists in effect on date of proposal.

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[22] National Bureau of Standards, Standards and Specifications for Nonmetallic Minerals and Their Products: Spec. 364, United States Government Master Specifications for Condiments, Dec. 24, 1935.

Under the Food and Drug Administration of the United States Department of Agriculture, the following standard was issued November 4, 1936:

> Table Salt, Dairy Salt. - Fine-grained crystalline salt containing, on a water-free basis, not more than 1.4 percent of calcium sulphate ($CaSO_4$), not more than 0.5 percent of calcium and magnesium chlorides ($CaCl_2$ and $MgCl_2$), nor more than 0.1 percent of matters insoluble in water.[a]

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[a] Pending further announcement, no exception will be taken by the Food and Drug Administration to table salt that meets the requirement of the standard except that it contains anhydrous calcium sulphate (anhydrite) in excess of 0.1 percent, provided that the total calcium sulphate content does not exceed 1.4 percent.

Salt to be used in the food industry must necessarily be of a very high degree of purity and for some foods only certain percentages of impurities are allowable. For example, to make good sauerkraut the Bureau of Chemistry and Soils recommends the following:

> Salt used for this purpose should flow freely; that is, it should be dry and not caked or lumpy. This is essential in order that it may be distributed evenly. It should be as free as possible from chemical impurities, especially alkaline impurities and those which would favor the absorption of moisture. Any salt which contains no more than the quantities of impurities given in the following list is suitable for the production of sauerkraut:

	Percent
Carbonate or bicarbonate of sodium, calcium or magnesium	1.0
Chloride of calcium or magnesium	.5
Calcium sulphate	1.4
Matter insoluble in water	.1

As for the exactions of industrial salt, what may be considered an impurity for certain industrial uses may not be objectionable for others. In refrigeration, impurities would be of no consequence, but in the food industry they are of paramount importance. Also, specifications for the dye industry are exacting.

In between the foregoing extremes are varying requirements. Phalen says:[23]

> Penalties, if any, are generally based on the moisture content. If the moisture in a shipment exceeds the guarantee at the time the sale is made, the customer can get an adjustment.

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[23] Phalen, W. C., The Marketing of Salt: Eng. and Min. Jour.-Press, Jan. 27, 1923, p. 189.

As concerns analysis of the salt for specific purposes, if purity or any specific grade is required by the salt user, it is the buyer's duty to analyze the material he buys to insure that he is receiving what he requires. In the article quoted above, Phalen says:

> Those purchasers who buy the largest quantities often have their own chemical laboratories and maintain a staff of competent chemists. They know what they are buying and are able to secure the superior grades at favorable prices. Small buyers who occasionally take a carload must accept the seller's word where they have no facilities for checking him up. It is customary to give the product first a visual test, after which it is turned over to the laboratory force for them to check up on the impurities. What is allowable among these latter depends on the uses to which the salt is put. In such industries as the dyeing industry, impurities have to be checked carefully.

PACKING

Salt is marketed (1) in "bulk", as loose salt, or (2) "packaged" in (a) buyer's sacks (50 to 200 pounds), (b) producer's sacks (50 pounds or more), (c) round or square cartons, (d) small bags, and (e) pressed blocks. High-grade salt is sometimes packed in cheese salt barrels of which the size is not standardized. However, at present not much is packed loose in barrels, but small cotton pockets and bags of salt are often packed in 280- and 300-pound barrels. Various limits are placed on the minimum amount in which bulk salt may be shipped, as discussed later in this report under transportation. The minimum for shipments of bulk salt is listed in Chemical Industries - Buyer's Guide-book number, October 25, 1938, at 50,000 pounds. This guide also lists boxes of 5- and 25-pound content and bottles of 1/4, 1, and 5 pounds.

Blocks of cattle salt usually weigh 50 to 60 pounds, but smaller blocks sometimes are made for sheep. Blocks are shipped loose. Rock salt is shipped in bulk or in bags, ranging from 5-pound cartons of ice cream salt to 200-pound burlap sacks.

Table salt is now always sold packaged, and that which comes into our homes never has been touched by hands before - all the recovery and packing operations have been accomplished by machinery. The cartons range from 24 ounces to 3 pounds, packed in cases. Subsequent to the NRA Salt Code, the producers announced that no "pockets" of table salt would be shipped loose in smaller units than 25 pounds and that iodized salt in cartons would be sold only in round cans containing either 26 ounces or 2 pounds. This practice is still in effect generally. In certain areas it is possible to buy pockets of table salt as small as 1 1/2 pounds, but they usually are shipped in bales, barrels, or containers of some kind.

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Salt producers and distributors, in cooperation with the Division of Simplified Practice of the National Bureau of Standards, continue to attempt to standardize the packing and packaging of salt for domestic sales. The first list of accepted packs, which became effective May 1, 1937, published as R-70 by the Bureau of Standards in 1928, is no longer in general use but is being revised as further elimination of obsolete packs seems advisable.

W. G. Wilcox, chairman, Standardization Committee, Salt Producers' Association, says that although a new set of standards has not yet been agreed upon, the following covers today's list (1938) of standard packs and packages of evaporated salt.

Table 1

Kiln-dried granulated, including Oklahoma, Louisiana, and Texas fine grades.

25 lb.	Packed in cotton.
50 lb.	Packed in cotton.
100 lb.	Packed in cotton.
140 lb.	Southern fine salt, packed in cotton or burlap (sold in New York territory only).
200 lb.	Packed in cotton or burlap.
280 lb.	Barrel (not sold in New York territory).

Table 2

Kiln-dried and air-dried medium, including competitive Louisiana and Texas grades.

25 lb.	Packed in cotton (not sold in New York territory).
50 lb.	Packed in cotton only (except in New York State territory, where it may be sold in either cotton or burlap bags).
70 lb.	Packed in cotton only (for special medium only).
100 lb.	Packed in cotton only (except in New York State territory, where it may be sold in either cotton or burlap bags).
140 lb.	Burlap (to be sold in New York territory only).
200 lb.	Burlap ONLY.
280 lb.	Barrel (not sold in New York territory).

Table 3

Kiln-dried and air-dried packers and ground alum salt.

50 lb.	Packed in burlap only.
100 lb.	Packed in burlap only.
140 lb.	Packed in burlap only.
200 lb.	Packed in burlap only.

Table 4

Salt in packages.

24 oz.	Square, packed 36/24.
2 lb.	Square, packed 24/2.
3 lb.	Square, packed 18/3.
3 lb.	Square, packed 18/3 Kosher salt.
3 lb.	Can ---------- cooking salt.
26 oz.	Round, packed 24/26 & 32/26.
2 lb.	Round, packed 24/2 & 32/2.
24 oz.	Hexagon, packed 36/24.
26 oz.	Hexagon, packed 36/26.

Table 5

Table salt in pockets and bags.

1 1/2 lb.	Pockets	Packed in bales, barrels, containers	(confined to Texas, KZ*, and City of Chicago).
2 lb.	Pockets	"	
3 lb.	"	"	
4 lb.	"	"	
5 lb.	"	"	
10 lb.	"	"	
25 lb.	Cotton bags.		
50 lb.	" "		
100 lb.	" "		
280 lb.	Barrel.		

*KZ refers to territory including Kansas, Oklahoma, Nebraska, New Mexico, Southern Missouri, Colorado, Utah, and most of South Dakota.

Table 6

High-grade salt.

10 lb.	Packed in cotton, 14/10 bales and 6/10 fiber containers.
25 lb.	Packed in cotton.
25 lb.	Packed in cotton, popcorn salt in 25 lb. bags, one 25 lb. bag in a shipping case.
50 lb.	Packed in cotton.
100 lb.	" " "
140 lb.	" " "
200 lb.	" " "
280 lb.	Barrel.

Cheese salt barrel (size not standardized).

Table 7

Rock salt, coarse grades.

5 lb.	Carton, ice-cream salt, in cases 12/5.
5 lb.	Pocket, ice-cream salt, in bales, 20/5s, 40/5s, and 12/5 containers.
10 lb.	Pocket, in bales, 10/10s, 20/10s, and 6/10 containers.
25 lb.	Packed in cotton or burlap.
50 lb.	" " " " "
100 lb.	" " " " "
140 lb.	" " " " " (In Virginia, North Carolina, and New York territory only).
200 lb.	Packed in burlap only.

Table 8

Blocks.

50 lb.	Plain salt.
50 lb.	Sulphur block, containing 2% sulphur.
50 lb.	Iodized block, containing 0.023% potassium iodide a coloring with iron oxide optional.

In Southern Territory only salt bricks packed 15/4s.

Harry M. Griffiths says that the sizes of containers used for rock salt in the fields of New York, Michigan, and Louisiana are as follows:

New York field

4-lb. cartons, 15 per case.
10-lb. bags, Packed 10 in a burlap bag.
50-lb. bags.
100-lb. bags.

Michigan field

10-lb. bags, packed 10 in a burlap bag.
50-lb. bags.
100-lb. bags.
200-lb. bags.

Louisiana field

Bags

2-lb. bags, 140 per barrel, 70 per bale, 30 per case.
3-lb. bags, 100 per barrel, 50 per bale, 20 per case.
4-lb. bags, 70 per barrel, 35 per bale, 15 per case.
5-lb. bags, 60 per barrel, 30 per bale, 12 per case.
10-lb. bags, 28 per barrel, 14 per bale, 6 per case.
25-lb. bags.
50-lb. bags.
100-lb. bags.
200-lb. bags.

Cartons

2-lb. round, damp-proof cartons, 24 to case.
2-lb. square cartons, 24 to case.
3-lb. square cartons, 18 to case.
4-lb. square cartons, 15 to case.
1 1/2-lb. square cartons, 36 to case.

Barrels

Barrels, 280 lb.

Sales of salt in bulk are made, as far as possible, only to large industrial users, because producers want to retain for themselves, if possible, any profits they can get from packaging as well as from the sale of the salt itself. Industrialists who cannot buy full carloads are required to buy the packaged salt - that is, in bags.

However, the salt producers have succeeded in reducing greatly, if not entirely, the amount of bulk salt sold to jobbers who might package it for resale and thus compete with the producers themselves, such competition being the main objection to the sale of bulk salt to resellers, and it is understood that consumers who purchase bulk salt are requested not to resell it. The practice of shipping mixed carloads of bulk and packaged salt together was discontinued. Some producers have gone farther and stipulated that pooled-car shipments of salt in bulk would not be made to consumers. Jobbers have held that they could furnish a service that the manufacturer or his distributor was not in a position to give and that sometimes they could bag the salt cheaper because they had less overhead. By buying from the jobber, a consumer could get small lots at a better price and more promptly, thus avoiding having to provide storage facilities and the responsibility he would have to assume if he bought in carload lots direct from the manufacturer.

In general, however, it may be stated on good authority that in some parts of the country little or no bulk salt is being shipped at present, although in some sections cooperative farm organizations do buy their salt in 100-pound bags. In Virginia, according to correspondence received by the author, 90 percent of the salt forwarded in carload lots to packing houses and private individuals for curing meats and for other purposes for which bulk salt would be used is now shipped in 100-pound bags. Shipments of salt in 60-pound bags are made, but they are small.

According to the Tariff Commission study already mentioned,[24] more than half of the total tonnage of dry salt produced during the 5-year period 1929-33 was sold in bulk, including both rock and evaporated salt. A further breakdown of these bulk-salt shipments into types of salt indicates that bulk salt comprised 70 percent of the rock salt sold, almost 30 percent of the vacuum-evaporated salt, 22 percent of the grainer-evaporated salt, and almost 62 percent of the solar-evaporated sa

Packaged salt costs 25 to 50 percent more than bulk salt, depending upon the difference in grade, freight charges, etc.

According to W. G. Wilcox (letter to writer), salt used primarily for food processing, such as flake salt for baking, butter, flour, meat canning, and stock iodine (at the customer's option), recently has been available packed in multiwall moistureproof bags to protect the product from moisture and to prevent contamination.

PRICES

The yearly average unit value of rock salt for all of the United States for the decade 1926-35, inclusive, as calculated from returns of producers to the Bureau of Mines, was $3.19 per ton, or only 47 percent of that of evaporated salt, which was $6.74. However, the latter fluctuated from $5.71 to $7.33 per ton, whereas rock salt was more stable, ranging from $2.97 to $3.39 per ton. The totals given above include the pressed blocks for their respective classes of salt. The value variation between loose salt and the blocks in the evaporated group is about $1 and in the rock-salt class is about $2.50, the blocks, of course, having the higher value.

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[24] United States Tariff Commission, Production and Distribution of Sal in the United States by Primary Producers: March 1935, p. 7.

The Bureau of the Census (United States Department of Commerce) also reports values of salt, but its statistics are not comparable to those of the Bureau of Mines because they comprise only the establishments manufacturing commercial salt, whether from rock salt or from brine sources, and do not include the salt content of brines used in the manufacture of chemicals. Moreover, the Census figures for the value of the product include the value of containers, whereas those of the Bureau of Mines relate only to salt.

Salt is sold on a delivered basis, and prices in various parts of the United States are far from uniform. Price lists of salt are published from time to time by members of the Salt Producers Association and are furnished to its head office for filing or for the information of other members. The lists pertain to past transactions, as it is not the policy of the association to attempt to reach any agreement with respect to future prices. Moreover, the printed price lists constitute the basic prices and, in that condition, do not reveal what the average consumer pays, even in a given market area, for they do not include transportation costs or sundry other items, such as various discounts. The basic prices applying to a natural marketing area are fairly uniform with regard to the same or comparable grades of salt, but the schedules may vary between areas.

It is impossible to obtain definite prevailing prices for every section of our country. Even the NRA, with all its facilities, was not successful in obtaining a complete list; the Consumers Advisory Board gathered the only salt price lists available, in the spring of 1934. Although the prices given in the following pages, aside from the journal quotations, are "spotty", it is believed that they are important enough to include in a discussion of prices.

It has been said that the price system broke down completely in the last decade, and by 1936 prices had reached the lowest level in years, but such conditions are not revealed in the wholesale prices of salt at Chicago, as shown in the accompanying table, or in those for New York.

The United States Bureau of Labor Statistics reports of wholesale prices of various commodities include those of American medium salt and granulated salt at Chicago, the only point for which the prices are quoted. The following information was abstracted from such reports.

Briefly, the trend of wholesale prices of American medium salt at Chicago was downward from 1890 to 1900, $0.79 per barrel (280 lb.) in 1890 to $0.64 in 1899. In 1900, the average price jumped to $1, only to decline again to $0.61. In 1904 it rose to $0.77, and after declining

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slightly for 2 years - $0.75 and $0.71 - turned upward once more in 1907 and continued to rise to a peak of $2.73 in 1920, after which it declined steadily for several years of the period up to 1926.

The wholesale quotations for granulated salt begin with 1913. After remaining at $3.25 for 3 years, the annual average rose in 1916 to $3.89 and in 1917 almost doubled itself, $7.12. In 1918 it rose still farther to $8.70, dropped to $8.02 in 1919, and to $8.14 in 1920, rose sharply to $10.21 in 1921, dropped to $8.96 in 1922, $8,86 in 1923, $8.30 in 1924, $7.71 in 1925, and $7.51 in 1926.

The wholesale prices and index numbers for both grades of salt for the decade 1926-35 are given in the accompanying table.

Average wholesale prices and index numbers of salt, 1926-35

(1926 = 100)

Year	At Chicago			
	American medium		Granulated bulk	
	Average price per bbl. (280 lb.)	Relative price	Average price per ton	Relative price
1926.	$2.195	100.0	$7.509	100.0
1927.	2.195	100.0	6.754	89.9
1928.	2.272	103.5	6.600	87.9
1929.	2.214	100.9	6.600	87.9
1930.	2.112	96.2	6.600	87.9
1931.	2.372	108.7	6.600	87.9
1932.	2.347	106.9	6.859	91.3
1933.	2.276	103.7	6.790	90.4
1934.	2.413	109.9	6.627	88.3
1935.	2.513	114.5	6.940	92.4

In a number of producing and marketing areas rock salt has brought a price of $5 to $6 per ton, but the Kansas field for a long time has been able to obtain only around $4 per ton, owing, it is claimed, to sales of the surplus salt produced by the meat packers. The price for the crushed rock salt sometimes has gone as low as $2 per ton in the last decade. A slightly higher price was asked for truckload lots abov carload lots.

Retail price tabulations are not available for the decade, but the Bureau of Labor Statistics began in January 1934 to collect and publish the average actual retail prices of table salt sold at grocery stores. For both 1934 and 1935 the price was 4.4 cents per pound for all the United States. More or less typical of the "mark-ups" at various stag in distribution is the following actual example: In a central Eastern district, in the latter part of 1934, cases of 24 cartons of 2-pound size were sold to the wholesaler at about 76 cents, or a trifle over, per case. The wholesaler sold to the retailer at about 91 cents or slightly higher, making a margin of 15 cents a case. The retailer sold the cartons at about 5 cents each, bringing $1.20 per case, which netted him a profit of about 28 or 29 cents per case, or a little over 1 cent per carton. The purchaser in this example paid 2 1/2 cents a pound for salt that probably could have been bought at the mine, wholesale, in bulk, and ungraded, for less than 1/2 cent, perhaps as low as 1/4 cent a pound.

In the Chicago market in 1934 the wholesaler bought a case of salt at 75 cents gross, sold it to the retailer at 80 cents, making a margin of 5 cents a case. Sometimes the margin was 10 or 12 cents a case where the cost of operation was 40 cents a case gross.

At the Laguna Salina salt plant in New Mexico the price of salt in 1933[25] ranged from 30 to 40 cents a 100 pounds at the lake, depending upon the quality. All salt was sold crude, with no attempt at refining, but three grades were separated in harvesting, averaging, respectively, about 85, 92, and 98 percent purity. The market was localized within 150 miles of the plant, and ranchers bought the salt for their cattle.

During a discussion of brokerage in the NRA period, a statement regarding prices was made by one of the cooperative organizations that before the brokerage was discontinued the cooperative could buy Kansas rock salt at $2 per ton, which after discontinuance cost $3 per ton and soon after was raised to $5 per ton. (This obviously relates to salt at point of shipment.)

In a circular letter in November 1933, regarding prices to consumers in an eastern key letter territory, a large salt company stated that

> Under agricultural or refuse salt we will make exceptions and sell the following industries that consume salt at $4 per ton, in bulk, in carload lots, f.o.b. car our works, with the regular bag differentials of $3.80 per ton for 100-pound and 140-pound bags and $3.30 per ton for 200-pound bags; steel mills, fisheries, ceramic manufacturers, and track use.

These instructions were issued to the salesmen, who were supposed to add freight and calculate the ultimate price to be quoted to buyers.

In a midwestern section of our country before 1934, the price of granulated bulk was $5.50 per ton, shipping point, whereas in the spring of 1934 it was $11.10 per ton. If the dealer wanted to buy the same bulk salt for resale, the price was $14.10. Therefore, the dealer had to pay $3 per ton more to the salt companies than the other industries for the same salt. This swings back to the problem of bulk-salt marketing but it is given here for the price quotations.

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[25] Talmadge, S. B., and Wooton, F. P., The Non-Metallic Resources of New Mexico and Their Economic Features. New Mexico School of Mines and Mineral Resources Bull. 12, 1937, pp. 140-147.

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Complaints have been voiced in the past that often the same salt was sold for different purposes at different prices. A case in point, early in 1934, was that meat packers were buying salt at $4 per ton while the same grade of salt was being sold for other purposes at $6.50 per ton.

During the administration of the Salt Code the New York area prices of the distributors for certain grades of salt were as follows: Bag price, $11.80 per ton before October 1933 and $11.40 per ton after October 1933; bulk price, $10.80 per ton before October 1933 and $10.40 per ton after October 1933 - all for carload lots. In less-than-carload lots bag salt was $16.80 per ton and was sold in no less than 5-ton lots.

The prices charged by one of the jobbers in this area when selling the salt to factory consumers were as follows: Bag price, $13 per ton direct from car to factory; in 3-ton lots, $14 from warehouse to consumer, or in I-ton lots at $15 per ton from warehouse to consumer.

In 1934 the distributors' price list was as follows: Bagged salt in carload lots, $14.20 per ton, and pooled carload bagged salt, $15.20 per ton; in less than carload lots, $15.40, and bulk salt in carload lots, $10.90 per ton.

For the salt the jobber bought at $10.90 his prices were as follows: In 3-ton lots of bagged salt from car to consumer, $14 per ton; in 3-ton lots from warehouse to consumer, $15 per ton; in 1-ton lots from warehouse to consumer, $16 per ton; and bulk salt from car to consumer, $14 per ton.

In the spring of 1934, according to bids received by a Government department for salt for water softening, the price quoted by five companies was $11 per ton and by one company $12.55 per ton on 60 short to

In 1935 the current prices for salt in British Columbia for use in the fisheries was reported as $8.85 per ton, while salt for other industrial purposes was selling at $11 a ton. Most of the salt came from the United States and the prices were comparable with those on the Pacific coast of this country.

Some of the trade journals now quote weekly prices at New York, but their lists do not go back farther than 1927.

Chemical Markets quotations for "sodium chloride technical"[26] beg in 1927 at $12 per ton (this was also the price quotation in 1914, alth Chemical Markets was not published then) and did not rise above $13 a t until 1933, when they spread to a range of $11.40 to $16.50 a ton, whic narrowed to a range of $13.50 to $16.50 a ton in 1935 and 1936.

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[26] "Technical grade" means the ordinary commercial product.

The Oil, Paint, and Drug Reporter quotations at New York, beginning with 1930, remained unchanged from 1930 to 1934, "salt, rock, car lots, bags" being listed at $11.40 a ton and l.c.l. shipments at $14. In 1935 the following listings were made: Salt "reclaimed",[27] car lots, delivered New York, ton $14.58; bags delivered New York, to $14.08; less-car lots, delivered New York, bags, ton $17.

Any of these prices quoted in this section are a far cry from the times during the Civil War when a dollar a pound was paid for salt of quality far less pure than we have today.

Discounts

The most common discounts given by salt companies are based upon quantity purchased, and these may be divided into several types: (1) Carload discounts and pooled-car discounts, whether to reseller or consumers; (2) discounts based upon quantitative total annual purchases (under this type would also come the discounts given to the contract consumers who agree to buy all their industrial salt from the company with whom they have contracted); and (3) discounts to certain types of resellers of salt (chain stores, etc.).

As quantity discounts may vary a great deal with the various companies in different areas and under different conditions it is impractical to attempt to quote any of the discounts except in a general way to indicate the range of discounts on past transactions. The Salt Code attempted to stabilize the quantity-discount practice, so that while such discounts might vary (like published prices) between the marketing areas, they would not do so within an area. In addition, the discounts for the various types of salt might vary and sometimes did so considerably. However, since the code period the discounts have been as unstable as they were prior to it.

The discounts on industrial salt are definitely smaller and have a narrower range than those for table salt, because much of the industrial salt is sold in bulk in large lots. The margin on which bulk salt is sold is very much smaller than for packaged salt.

In the past the discounts on industrial salt have ranged between 2 and 8 percent. According to present New York quotations on bagged rock salt the difference in price between l.c.l. lots and car lots is about $1.80 which in a range of prices amounts to between 11 1/2 and 12 percent discount.

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[27] "Reclaimed salt", according to the managing editor of this journal, "is a byproduct of the electrolytic production of caustic soda and chlorine and has some use at a low price in the treatment of water for industrial uses." It is the common commercial designation. The item is no longer listed in current prices, as its price is subject to sudden change because of irregularity of supply.

Discounts on table salt in the past have ranged from 13 to 18 percent on salt sold to wholesalers. Discounts on table salt to chain stores in the past decade were on a sliding scale of 2 percent on purchases amounting to $25,000 covering a 12-month period, all the way up to 10 percent on $250,000 and over. It is understood that toward the end of the code the quantity maximum given to chain stores in the New England marketing area was reduced to a maximum discount of 3 percent and it was extended not only to national chains but local chains, cooperatives, and independent stores, according to facts developed in a personal interview by Moise and Haddock. Further, it was said, "it is still (1936) the practice to allow a 10-percent discount to chain stores in marketing areas other than in New England."

In the latter part of 1935 in the eastern area a manufacturer was offering to wholesalers a 20-percent discount on delivered prices of packaged table salt.

In the present quoted prices of bagged salt at New York, the difference in price between l.c.l. lots and car lots range between $1 and $5.70 which amounts to 6 to 29 percent discount if the highest price of $21 per ton (assumed to be for very small lots) is used.

A well-recognized influence on prices and size of discounts on salt to large consumer buyers is the fact that those consumers may go into the producing business themselves to supply their needs if prices are not favorable. This has been done, for example, by the two Chicago meat packers who have a joint salt operation in the Kansas producing field and a food company that has its own salt-producing operations. Virtually all, if not actually all of the largest chemical companies whose products are based on salt or require its use in quantity for processing have long had their own salt-producing plants. This is possible because the country has such vast widely scattered salt resources.

Coastal Markets

Prices in coastal salt markets are sometimes upset by the cheaper imported salt. The lower prices for such salt are explained in several ways. Much of it is brought in by boats as ballast; it is produced by cheaper labor; it is chiefly solar salt produced in hotter and drier climates, where evaporation takes place more quickly than in domestic fields producing solar salt.

It has been observed, also, that the prices of this imported salt, even though indicated as always comparatively low, are not very stable, chiefly because transportation charges are variable. Interesting sidelights on this phase were brought out in tariff testimony in 1929, and as much the same conditions apply at present they are important to cite. It was stated that the freight rate from the New York section to Portland, Boston-Providence was $4.40 per ton; New York to Philadelphia, $3.60 per ton; and Norfolk, Va., $4.90 per ton. The freight was theref

54 1/2 percent of the selling price in Philadelphia and New York (the f.o.b. mine price received by the domestic producers then was said to be about $3 per ton of crushed rock salt), 60 percent of the selling price in New England, and 62 percent of the selling price at Norfolk.

Also, the competing foreign salt is shipped mostly in schooners, sometimes owned by the fishing trade who buy the salt, and the freight is largely a matter of bargaining. The 1929 rates ranged from $2.50 to $3 per ton. The steamer rate from the Mediterranean ports then was said to be higher than average for a number of years past and to New York was quoted at $3.25 per gross ton, equal to $2.90 per ton of 2,000 pounds. Tramp steamers wishing ballast cargo frequently accepted a much lower rate. Thus, it was claimed that even the standard ocean rates given the foreign salt were an advantage in transportation of 70 cents to $2 per ton.

Speaking of differentials in the freight rates, at New York City, where the domestic freight rate is lowest, the domestic producer was at a disadvantage of 70 cents; at Norfolk the importer had an advantage of $2; and at points south of Norfolk his advantage was considerably more.

When a representative of a salt company was asked, "What would be he additional cost to the importer of unloading his salt and preparing it gain for reshipment, and how far he would have to take his salt inland efore the railroad rate he would pay in America would make up the ifference?" the reply was that he could send it up to Washington and altimore by water or he could send it up the James River and unload it here cheaper than in New York.

It was shown further that although the importer is handicapped more nd more in proportion to the distance inland and consequently may not ompete successfully except in the coastal cities and in the territory ributary thereto, he can go a long way up the Mississippi, up the Hudson s far as Albany, up Chesapeake Bay to Baltimore, and up the Delaware to iladelphia. According to a deposition by domestic producers before e Committee on Reciprocity Information, February 1938, salt imports e taken inland more than 400 miles, and there are no domestic deposits thin 300 miles of the Atlantic seaboard.

It was stated further that as a great part of foreign salt is solar lt made from the sea water, it involves no freight to the boat. The ean freight rates in 1938 per net ton of salt to North American ports ve been as low as $2.68 from British West Indies and $2.78 from the diterranean countries.

The producers showed that prices of imported salt in 1938 were $1.65 $3.05 per net ton lower than the average market price of domestic rock lt in bulk from and to ports, as follows: The price differential was .80 ($9.70-$6.90) on salt from Sfax, Africa, to Portland, Me., for ril loading (of 2,000 tons); $3.05 ($9.70-$4.25) on salt from Sfax to

Portland for March loading (of 2.500 tons); $1.65 ($8.30-$6.65) on salt from Turks Island (British West Indies) to Boston, Mass.; and $2.75 ($8.70-$5.45) on salt from Turks Island to Norfolk, Va.

TRANSPORTATION AND STORAGE

Transportation is not an important factor in the salt industry, except as it affects distribution of the product; refineries and plants are generally at or close to the salt deposits. Hauling and hoisting in salt mines are done much as in mining coal. Salt in solution is piped to the plants. Dry salt moves to market mostly by rail; some is trucked, but mainly that to local trade. Nearly all imported salt is ocean-borne, and some of the domestic supply is shipped on river boats; but water transportation is relatively unimportant inland.

The compilation of State Freight Rate Books, which enable the member companies to calculate their delivered prices, was considered to be one of the most important accomplishments of the Salt Producers Association. These tables cover all the delivery points within a State and show the rates from the nearest producing plant. The delivered price of the salt is calculated by adding the freight charge from the producing or manufacturing plant to the point of delivery to the price given on the manufacturer's price schedule. Discounts are allowed generally on the total price and occasionally on prices at the mine.

With some exceptions, the minimum weight of a carload of loose bulk salt is 40 tons, but not to exceed the marked capacity of the car used; and of salt in packages or blocks, iodized or sulphurized salt in packages or blocks, in straight or mixed carloads, or in mixed carloads with salt in bulk, it is 22 tons. These limits are for line haul between main producing and marketing centers, and for some shorter hauls the minimum weight ranges between 15 and 40 tons for salt in bulk.

A few selected freight rates furnished by the Traffic Division Section of Tariffs, of the Interstate Commerce Commission, November 3, 1937, showing rates between some of the main producing points and some of the large salt-consuming centers, are given in the accompanying tables.

There are no industrial hazards in storing and handling salt. It is noninflammable and so cheap that it need not be insured in transit. Unless stored in a dry place, however, the impurities in the salt are likely to draw moisture and cause caking.

In figuring storage space of various kinds of salt, the following may be useful.[28]

1 cubic foot will hold any one of the following items:

Table salt, 43 pounds.
Coarse crushed salt, 52 pounds.
Fine crushed salt, 42 pounds.
Broken rock salt, 50 pounds.

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[28] From The General Engineering Co., Weights of Materials, p. 10.

Present freight rates on salt, carloads

(Rates in cents per 100 pounds)

To –	From –									
	Cuylerville,		Ludlowville, N.Y. Piffard, N. Y. Retsof, N. Y. Silver Springs, N. Y. Watkins Glen, N. Y.		Barberton, Ohio Cleveland, Ohio Rittman, Ohio		Pomeroy, Ohio Hartford, W.Va. Mason City, W.Va.		Delray, Mich. Detroit, Mich. Ecorse, Mich. Port Huron, Mich. Wyandotte, Mich.	
	A	B	A	B	A	B	A	B	A	B
Boston, Mass.	18	23	18	23	22	28	25	32	23	29
New York, N. Y.	16	20	16	20	20	26	21	27	22	28
Philadelphia, Pa.......	16	20	16	20	19	24	20	25	22	28
Norfolk, Va.	21	27	21	27	22	28	20	26	25	32
Chicago, Ill.	20	26	21	27	(C)15 (D)16	21	18	23	(C)14 (D)15	20
St. Louis, Mo.	24	31	25	32	20	26	20	25	20	25
New Orleans, La. .A-R..	44	55	44	55	39	48	38	47	39	49
R-O..	—	41	—	41	—	—	—	—	—	—
San Francisco, Calif. A-R	—	—	—	—	(E)92	(E)92	—	—	—	—
Los Angeles, Calif. A-R.	—	—	—	—	(E)92	(E)92	—	—	—	—

(See explanation of reference marks on page 52.)

Present freight rates on salt, carloads – Continued

(Rates in cents per 100 pounds)

To –	From –							
	Midland, Mich. Saginaw, Mich.		Ludington, Mich. Manistee, Mich.		Malden, W. Va.		So. Charleston, W. Va.	
	A	B	A	B	A	B	A	B
Boston, Mass.	24	30	27	34	25	32	26	33
New York, N. Y.	23	29	26	34	21	27	21	27
Philadelphia, Pa.	23	29	26	34	19	25	20	25
Norfolk, Va.	26	34	29	37	19	24	19	24
Chicago, Ill.	(C)14 (D)15	19	14	18	19	24	19	24
St. Louis, Mo.	20	26	20	25	21	27	21	27
New Orleans, La. ..... A-R.	40	49	40	51	36	45	36	45
R-O.	—	—	—	—	—	—	—	—
San Francisco, Calif.. A-R.	(E)85	(E)85	(E)85	(E)85	—	—	—	—
Los Angeles, Calif. .. A-R.	(E)85	(E)85	(E)85	(E)85	—	—	—	—

Explanation of reference marks:

Column A – Salt, common (sodium chloride), loose in bulk, carloads, minimum weight 80,000 pounds, but not to exceed the marked capacity of the car used.

Column B – Salt, common (sodium chloride), in packages or in machine-pressed or fused blocks. Salt, common, iodized and/or sulphurized, in packages or in machine-pressed or fused blocks; in straight or mixed carloads or in mixed carloads with salt, common (sodium chloride), loose in bulk, minimum weight 45,000 pounds.

(C) – Via certain routes named in the tariff.

(D) – Via routes other than (C).

[Except as otherwise shown, rates are in cents per 2,000 pounds (do not include marine insurance.)]

To -	From -									
	Louisiana Points L-Avery Island Weeks		M-Jefferson Island, La.		Winnfield, La.		Texas Points Grand Saline Hockley N-Salt City		Kansas Points Anthony Hutchinson Kanopolis Lyons.	
	A	B	A	B						
Boston, Massachusetts...	CF 804 CG 425	- -	- CG 425	- -						
New York, New York......	CG 425 DG 450 - -	CG 385 DG 410 - -	CGY 425 DGY 450 GVK 435 GIJKV 450	CGY 385 DGY 410 CK 395 GIJK 410						
Philadelphia, Penn.	CG 400 GE 4721/2	CG 385 GE 4321/2	CG 400 -	CG 385 -						
Norfolk, Virginia.......	CH 620 CG 400	- CG 385	- CG 400	- CG 385						
				Rates apply in cents per 100 pounds (all rail).						
	O	P	O	P	O	P	C	P	O	P
Chicago, Illinois.......	27	32	27	32	27	32	27	32	24	26 1/2
St. Louis, Missouri.....	24	29	24	29	24	29	24	29	20	22 1/2
New Orleans, Louisiana..	16	18 1/2	16	18 1/2	16	18 1/2	24	26 1/2	—	—
	Q		Q		Q		Q		Q	
San Francisco, Calif. ..	T 67		T 67		T 67		T 67		T 67	
Los Angeles, California.	T 67		T 67		T 67		T 67		T 67	
	-		-		-		-		-	
	-		-		-		-		-	
	-		-		-		-		-	

Rates on salt, carload – Continued

[Except as otherwise shown, rates are in cents per 2,000 pounds (do not include marine insurance.)]

	From –				
To –	Utah Points Axtell Redmond	Burmester, Utah	Saltair, Utah	California Points Alvarado Leslie Newark Redwood City	Long Beach, Calif.
Boston, Massachusetts....					
New York, New York.......					
Philadelphia, Penn.					
Norfolk, Virginia........					
Chicago, Illinois........					
St. Louis, Missouri......					
New Orleans, Louisiana...					
San Francisco, California	Q S 47 1/2 T 43	Q T 25	Q S 47 1/2 T 39	Q R 4 1/2 S 3 1/2	Q RW 21 1/2
Los Angeles, California..	R 51 1/2 U 38 1/2 – –	S 35 1/2 U 30 – –	S 35 1/2 U 30 – –	RW 21 1/2 – – –	R 5 S 4 1/2 T 4 U 3 1/2 V 3

A – Common salt in packages or in blocks, minimum weight 45,000 pounds (except as noted). B – Rock salt in bags, minimum weight 80,000 pounds. C – Rate does not include lighterage or other terminal charges.

D – Rate includes lighterage on lots of 100 tons or more. E – Rate includes lighterage on lots of 200 tons or more. F – Via rail, water and rail. G – Via rail and water. H – Via rail and water through Baltimore, Md. I – Will also apply on shipments in bulk. J – Rate applies only for delivery by lighter within free lighterage limits of New York Harbor and only on lots of 200,000 pounds or more.

K – In connection with Seatrain Lines, Inc., only, applies to Manhattan Terminal Station. L – Commodity rates named are from Avery Island, La. M – Commodity rates named are from Jefferson Island, La.

N – Salt City, Tex., is located adjacent to Palestine, Tex. O – Salt, common, loose or in bulk, minimum weight 80,000 pounds. P – Salt, common, loose or in bulk, or in packages, minimum weight 45,000 pounds.

Q – Salt, common, in bulk or in packages. R – Minimum weight, 30,000 pounds. S – Minimum weight, 40,000 pounds. T – Minimum weight, 50,000 pounds. U – Minimum weight, 60,000 pounds. V – Minimum weight, 80,000 pounds. W – Rate is shown as applicable only on Intrastate traffic. X – Where two or more rates, subject to different minimum weights, are shown for the same movement, the lower charge will apply. Y – Applies via Morgan Line.

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